

AD-A214 994



ANALYSIS OF AEROMEDICAL EVACUATION IN THE  
KOREAN WAR AND VIETNAM WAR

THESIS

Fred M. Clingman  
Captain, USAF

AFIT/GLM/LS/89S-9

DISTRIBUTION STATEMENT A

Approved for public release;  
Distribution Unlimited

DEPARTMENT OF THE AIR FORCE  
AIR UNIVERSITY

**AIR FORCE INSTITUTE OF TECHNOLOGY**

Wright-Patterson Air Force Base, Ohio

DTIC  
ELECTE  
DEC 06 1989  
S E D

89 12 03 144

AFIT/GLM/LS/89S-9

ANALYSIS OF AEROMEDICAL EVACUATION IN THE  
KOREAN WAR AND VIETNAM WAR

THESIS

Fred M. Clingman  
Captain, USAF

AFIT/GLM/LS/89S-9

Approved for public release; distribution unlimited

The contents of the document are technically accurate, and no sensitive items, detrimental ideas, or deleterious information is contained therein. Furthermore, the views expressed in the document are those of the author and do not necessarily reflect the views of the School of Systems and Logistics, the Air University, the United States Air Force, or the Department of Defense.

Accession For		
NTIS GRA&I		<input checked="" type="checkbox"/>
DTIC TAB		<input checked="" type="checkbox"/>
Unannounced		<input type="checkbox"/>
Justification		
By _____		
Distribution/		
Availability Codes		
Dist	Avail and/or Special	
A-1		



AFIT/GLM/LS/89S-9

ANALYSIS OF AEROMEDICAL EVACUATION IN THE  
KOREAN WAR AND VIETNAM WAR

THESIS

Presented to the Faculty of the School of Systems and Logistics  
of the Air Force Institute of Technology  
Air University  
In Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science in Logistics Management

Fred M. Clingman  
Captain, USAF

September 1989

Approved for public release; distribution unlimited

### Acknowledgements

I offer my thanks to the various libraries around the local area which provided me with much of my information. I thank the library staff of the AFIT Library, who provided information and helped me to obtain information from other libraries in the country. I extend my appreciation to the staffs of the Air Force Historical Research Center and Air University Library at Maxwell AFB, Alabama. They took great interest in finding necessary information.

I extend a very special thanks to Mr. Jerry Peppers, my thesis advisor for his assistance and expertise in helping me to complete this research. More important, I want to thank him for showing me the importance of studying and learning from the past.

Finally, I thank my wife Nora and children Billy and Karen, for their understanding and patience.

Fred M. Clingman

## Table Of Contents

	Page
Acknowledgements . . . . .	ii
List of Figures . . . . .	v
List of Tables . . . . .	vi
Abstract . . . . .	vii
I. Introduction . . . . .	1
General Issue . . . . .	1
Background . . . . .	3
Specific Problem . . . . .	8
Investigative Questions . . . . .	8
Scope of the Research . . . . .	9
II. Methodology . . . . .	11
Introduction . . . . .	11
Specific Methodology . . . . .	12
Presentation . . . . .	15
III. Korean War . . . . .	17
Introduction . . . . .	17
Types of Injuries and Disease Encountered . . . . .	19
Chain of Evacuation in the Korean War . . . . .	21
Aeromedical Evacuation Process in Korea . . . . .	24
Forward Aeromedical Evacuation . . . . .	26
Intratheater Aeromedical Evacuation . . . . .	34
Intertheater Aeromedical Evacuation . . . . .	46
Specific Problems Encountered and Lesson Learned . . . . .	51
IV. Vietnam War . . . . .	60
Overview . . . . .	60
Types of Injuries and Disease Encountered . . . . .	61
Disease . . . . .	63
Wounds . . . . .	67
Aeromedical Evacuation Process in Vietnam . . . . .	69
Forward Aeromedical Evacuation . . . . .	71
Tactical and Intratheater Evacuation . . . . .	98
Strategic and Intertheater Evacuation . . . . .	106
Specific Problems Encountered and Lesson Learned . . . . .	111

	Page
V. Conclusions and Recommendations . . . . .	117
Investigative Question Answers . . . . .	117
Conclusions . . . . .	123
Glossary . . . . .	125
Bibliography . . . . .	127
Vita . . . . .	133

### List of Figures

Figure	Page
1. Army Medical Evacuation Flowchart . . . . .	23
2. Map of Korea . . . . .	37
3. Request for Air Evacuation . . . . .	41
4. U.S. Army Evacuees to the United States . . . . .	50
5. Four Corps zones in South Vietnam . . . . .	62
6. Air Ambulance Units in Vietnam . . . . .	95



# List of Tables

Table	Page
1. U.S. Army Wounded Evacuees Received in the United States By Causative Agent . . . . .	20
2. Number and Percent of U.S. Army Wounded Evacuees by Type of Traumatism (2 Sept 1950 - 31 Dec 1953) . .	21
3. Monthly Medical Air Evacuation in FEAF . . . . .	38
4. Percentage Distribution of Evacuees Received in the United States (2 Sept 1950 - 31 Dec 1953) .	48
5. Evacuees from Japan-Korea Received in the U.S. by Service (2 Sept 1950 - 31 Dec 1953) . . . . .	48
6. U.S Army Evacuees (2 Sep 1950 - 31 Dec 1953) . . .	49
7. Hospital Admissions for All Causes, U.S. Army (Vietnam) . . . . .	63
8. Approximate Number of Man Days Lost From Duty By Cause Among U.S. Army Personnel in Vietnam, 1967-1970 . . . . .	65
9. Selected Causes of Admissions to Hospitals and Quarters Among Active-Duty Army Personnel in Vietnam, 1965-1970 . . . . .	66
10. Percent of Deaths and Wounds According to Agent Vietnam Jan 1965 - Jun 1970 . . . . .	68
ii. Evacuations by Army Air Ambulances in Vietnam . . .	97
12. Patients Evacuated by PACAF Aircraft . . . . .	104

Abstract

This study examined aeromedical evacuation during the Korean War and the Vietnam War. The two wars, the Korean and the Vietnam, are the most recent in our country's history, and will most likely be the type of conflict we as a nation will be committed to in the future. The purpose of this research was to identify and describe the major logistics and operational factors of aeromedical evacuation in the Korean War and the Vietnam War. The identification of successful logistic activities in aeromedical evacuation in each of these wars permits a comparison between the wars. The description and identification of factors and the comparison between the wars provides insight to problems that may be encountered in future conflicts. From the study of past experience in these two wars we can learn from the mistakes and successes and avoid the same problems in the future.

Chapter III examined aeromedical evacuation in the Korean War. This includes forward aeromedical evacuation, intratheater aeromedical evacuation and intertheater aeromedical evacuation.

Chapter IV examined aeromedical evacuation in the Vietnam War. The military services examined in this chapter are the Air Force, Army, and Navy.

Chapter V compares and contrasts methods of aeromedical evacuation used in each war. The chapter closes with conclusions based on the comparisons and provides recommendations to improve, and prepare for, aeromedical evacuation in future wars.

IF WE ONLY ACT FOR OURSELVES,  
TO NEGLECT THE STUDY OF HISTORY  
IS NOT PRUDENT; IF WE ARE  
ENTRUSTED WITH THE CARE OF OTHERS  
IT IS NOT JUST.

SAMUEL JOHNSON

# AN ANALYSIS OF AEROMEDICAL EVACUATION IN THE KOREAN WAR AND VIETNAM WAR

## I. Introduction

### General Issue

A historical study of aeromedical evacuation during the Korean War and the Vietnam War may provide some insight for improving aeromedical evacuation procedures in future similar conflicts. The two wars, the Korean and the Vietnam, are the most recent in our country's history, and will most likely be the type of conflict, as opposed to a worldwide conflict, we as a nation will be committed to in the future.

The study of past events is a crucial element in preparing for possible situations in the future.

Unless we understand the events of yesterday, the difficulties of tomorrow are distorted, and the successes of tomorrow may be delayed indefinitely (5:29).

Jerome Peppers writes in his book;

If the nation is to escape or even minimize the blunders of the past, it cannot neglect to study its mistakes. Therefore, we must recognize that, for logisticians, the study of military logistics history is vitally important because of the nature of the problems faced by military leadership. The study of military logistics history will help the logistician, and the student of logistics, to more readily identify current problems and it will suggest potential avenues of solution to those problems. Further, and perhaps far more important, the study will help logisticians create more effective logistics systems for tomorrow (58:iii).

There are many different definitions for the term logistics. The concept of logistics is not an easy one to understand nor is it interpreted the same by different people. DOD 500.8 defines logisitics as:

The functional fields of military operations concerned with:

- (1) Material requirements;
- (2) Production planning and scheduling;
- (3) Acquisition, inventory management, storage, maintenance, distribution and disposal of material, supplies, tools, and equipment;
- (4) Transportation, communication, petroleum, and other logistical services;
- (5) supply, cataloging, standardization, and quality control;
- (6) commercial and industrial activities and facilities including industrial equipment;
- (7) vulnerability of resources to attack damage

This definition of logistics covers many different areas. The medical services, in the Korean and Vietnam Wars, had more control over the items listed in the definition than did most other units. This was because the materiel, supplies, equipment, people, and other items were only used and many times only understood by the medical sevices. Aeromedical evacuation was only a part of the medical services in the two wars, but a very important and critical link in medical logistics.

In every war fought there have been both individuals killed and wounded. Evacuation methods, and in the more recent wars aeromedical evacuation procedures, represent an integral component in the capability of military forces to treat the wounded and save lives. The ratio of deaths to

deaths plus surviving wounded (deaths as a percentage of hits) was 29.3 percent in World War II, 26.3 percent in the Korean War, and 19.0 percent in the Vietnam War. The ratio of killed in action (KIA) to wounded in action (WIA) was 1 to 3.1 in World War II, 1 to 4.1 in the Korean War, and 1 to 5.6 in the Vietnam War (51:52). Aeromedical evacuation, by quickly getting the wounded to treatment areas, was a significant beneficial contributor to these findings. A wounded person's chance of surviving improved with each war. The injured's chances of recovery in Vietnam were 2.2 times better than in Korea, 4.5 times better than in World War II, and 8.5 times better than in World War I (40:). The use of aeromedical evacuation increased with each war and is a notable contribution to the improved chance of recovery.

### Background

During the Civil War Assistant Surgeon Jonathan Letterman, after observing the wounded lie uncared for as long as a week, took the first steps toward a system of evacuating the sick and injured from the front lines. His plan, first used at the Battle of Antietam, used field stations and ambulances. His plan, officially adopted by the United States Army in 1864, was standardized during the Spanish American War in 1898. The system was based upon a "chain of evacuation", where the wounded were carried from the battle area to aid stations. From there, field ambulances carried

them to clearing stations, and from there they were transferred to field hospitals for further treatment (27:29). Evacuation from the field hospitals to the base and general hospitals was dependent upon rail and water transportation. The Civil War was the first war in which United States military forces used specially designed ambulance wagons for the evacuation of the wounded from the front lines (41:243-246). This system was the beginning of many of today's evacuation techniques and aeromedical evacuation had become a very important link in that chain.

The first evacuation of wounded military personnel by airplane was in World War I at Flanders on April 18, 1918. A French medical officer, Dr. Chaissang, had drawn plans for the modification of two French military planes. He supervised the modification of the planes which provided enough space for two wounded soldiers behind the pilot's cockpit. The patients were inserted through the side of the fuselage. Aeromedical evacuation of wounded was used to a very minor extent in World War I because of the lack of a practical airplane available for this type mission. The airplanes used were all converted military tactical models. The fuselages were too narrow to hold stretchers and they were all of open cockpit design. The patients would also have to be exposed to the cold air (18:2-3).

The first successful air ambulance in the United States was created by Captain William C. Oaker and Major William E.



Driver in 1918. They converted a Jenny biplane by removing the rear cockpit and rearranging equipment so a standard army stretcher would fit into the area. This airplane was used giving assistance to pilots who had crashed in remote areas where the converted Jenny could land reasonably near by. Crashes occurred frequently during this period because airmail routes had just begun and flights were attempted in all kinds of weather and at night without proper flying instruments or pilot training. The use of the ambulance plane allowed a doctor to fly to the injured pilot, treat him on the spot, then have him flown to a hospital, if necessary (18:3).

Even though the use of the airplane as a means of transporting wounded and sick had made significant advancements since World War I, at the beginning of World War II many military authorities believed the air evacuation of patients was not only dangerous but medically unsound and militarily impossible. General David Grant, the first Air Surgeon of the Army Air Forces, proposed an air evacuation service which was met with much opposition in the upper levels of the Army. Grant kept pushing for an air evacuation system and in June of 1942 he was successful (18:8).

Grant's first problem was locating planes. There was a shortage of warplanes and none could be spared for the ambulance service. Military transport planes (C-46, C-47, and later C-54) were used. These planes brought supplies

and troops to the front and then usually flew empty back to base. The planes were equipped with litters to carry the wounded and provided a supply of medical equipment. Grant pushed for the use of nurses to care for the wounded being evacuated by air. This was against the opposition of many generals who believed women belonged on the ground and in rear echelons. Grant insisted and the recruiting of nurses for the new Army Air Evacuation Service was begun on an urgent basis. He was present for the graduation of the first class of flight nurses in February 1943. New hospitals were built alongside many airstrips to provide for medical attention to wounded during flight stopovers (18:9-11).

The first large scale air evacuation operation by the U.S. Army Air Force in a combat situation was in New Guinea in August 1942. The Fifth Air Force evacuated more than 13,000 patients over 700 miles to Australia in seven days during an Allied counter-offensive against the Japanese (64:103).

By 1943, the air evacuation service began to move significant numbers of wounded. That year 173,500 wounded and sick personnel were air evacuated back to the United States. The following year 545,000 wounded and sick were air evacuated and in 1945, before the war ended, 454,000 personnel (a rate of one million per year) were evacuated. This process had shown that aeromedical evacuation was a viable alternative. One of those convinced of the impor-

tance of air evacuation was General Dwight D. Eisenhower, Commander of the Armies that invaded Europe. Speaking of the record 350,000 wounded air evacuated from D-Day to victory he said, "We evacuated almost everyone from our forward hospitals by air, and it has unquestionably saved hundreds of lives - thousands of lives" (18:11).

Helicopters were rarely used in World War II. In November of 1943 the Sikorsky R-6 was the first helicopter flown in a test flight for evacuation purposes. It carried a pilot, medical attendant, and two litter patients. The litter was attached to the outside of the helicopter to accommodate easy loading and unloading. During the flight the patients could be seen by the crew and a two-way intercom system was used for communication with the patients (64:103-104). The first helicopter used as a rescue and medical evacuation device in April 1944, by Lt. Carter Harman. He was one of the first Army Air Forces pilots trained in helicopters. He flew for the 1st Air Commando Force, U.S. Army Air Forces, in India. On 23 April he flew one of the unit's new litter bearing helicopters to pick up a stranded party with casualties, about 25 kilometers west of Mawlu, Burma. On his return he had completed the U.S. Army's first helicopter medical evacuation mission (22:9). Helicopters became the primary air evacuation instrument in Korea and Vietnam for all U.S. military services.

Air evacuation of military patients continued after the end of World War II. On 7 September 1949 the Secretary of Defense directed that evacuation of all sick and wounded, in peace and war, would be accomplished by air as the method of choice. Hospitals ships and other means would only be used in unusual circumstances (64:104). The use of air evacuation had finally come into it's own.

### Specific Problem

The purpose of this research was to identify and describe the major logistics and operational factors of aeromedical evacuation in the Korean War and the Vietnam War. The identification of successful logistic activities in aeromedical evacuation in each of these wars permits a comparison between the wars. The description and identification of factors and the comparison between the wars provides the answer to the question: What can be done in future wars to better prepare and improve the logistics and operations of aeromedical evacuation?

### Investigative Questions

The following investigative questions guided the research to answer the basic problem stated above.

1. What means of aeromedical evacuation (types of aircraft) were used in each war?
2. What types of injuries were incurred in each war?
3. What types of medical equipment were used in the evacuation in each war?

4. In each war, what types of medical personnel (doctors, nurses, medics) were involved in the air evacuation and what were their responsibilities?
5. What were the organizational structures of the agencies, of each of the services, given the responsibility of aeromedical evacuation in each of the wars?
6. How was information necessary for a successful aeromedical evacuation communicated in each of the wars?
7. What were the aeromedical evacuation lessons learned in each conflict?
8. Were the lessons learned in the Korean War applied effectively in preparing and conducting the Vietnam War?

#### Scope of the Research

The medical services performed in an exceptional manner in both the Korean War and Vietnam War. The medical personnel, hospital systems, medical supply, and many other medical functions all contributed to the success of medical operations and logistics in both wars. Even though these other areas were an integral part of the accomplishments of the medical services in the two wars, they were not included in this research. Only aeromedical evacuation was included.

There were other types of evacuation used in addition to aeromedical evacuation in the Korean and Vietnam Wars. The other types of evacuation (soldiers on foot, combat vehicles, other vehicles, animals, and ships) were very important in the evacuation of wounded in both the Korean

and Vietnam Wars, but they were not included in this research.

The aircraft employed in aeromedical evacuation, such as the helicopter, were often used for the movement of troops and supplies, and for other essential combat support tasks. Their uses in other assignments were not included in this research.

## II. Methodology

### Introduction

The methodology used in this research is the historical analysis technique. "Historical research is the systematic and objective location, evaluation, and synthesis of evidence in order to establish facts and draw conclusions concerning past events" (9:260).

Data is broken down into two categories, primary data and secondary data. Although many of the people of the past are now gone, in attempting to study data from a historical standpoint, it is necessary to attempt to reconstruct as closely as possible the actual situations of their time. Records of the words these individuals spoke and wrote, the testimony of friends and acquaintances, and the personal records they have left behind are all considered primary data. Secondary data are the thoughts of others not involved or in attendance at a historical event. The use of primary data tends to strengthen the reliability of the research (42:87), while secondary data can be found much easier and more quickly (26:135). Jerome Peppers writes;

We must be cautious about one important factor. No matter how well-done the research, or how carefully conceived the writing, we can never be completely certain nor can we ever be in complete agreement, about what actually happened in the days of the past. None of us can fully and faithfully recall impressions, perceptions, or emotions which led to certain decisions. Particularly this is true for the writer who might

not have been present at the event or place of decision (58:iii).

There are usually two types of evaluation when using historical research data. First, a judgement must be made as to the authenticity of the document. This is referred to as external criticism (42:88). Second, an evaluation must be made of the accuracy and worth of the data contained in the document. This is referred to as internal criticism (9:264-265). In this research external criticism should not be a difficulty due to genuineness of the data selected. Internal criticism will be much more of a problem. Three problems identified by Borg and Gall are the competency of the observer, individuals purposely biasing an observation, and tendency for some individuals to exaggerate their role in a situation. This exaggeration is often not intentional but reflects the experience from the view of the individual concerned (9:265-267). Even though overstated, the Durants convey the thought that, "Most history is guessing, and the rest is prejudice" (24:12). Obtaining many sources of the same event often will reduce the exaggerations, biases, and incompetencies of many of the individuals writing the reports.

### Specific Methodology

The following is an outline of the specific methodology used to gather and evaluate data in this thesis.

#### I. Searched for related literature



- A. Previewed indexes, abstracts, books, journal articles, magazine articles, transcripts, and historical documents relating to aeromedical evacuation in the Korean and Vietnam Wars.
  - 1. Air Force Institute of Technology Library, WPAFB, OH.
  - 2. Air University Library, Maxwell AFB, AL.
  - 3. Kettering Medical Center Library, Kettering, OH.
  - 4. Montgomery County Library, Dayton, OH.
  - 5. United States Air Force Academy Library, Colorado Springs, CO.
  - 6. WPAFB Medical Center Library, WPAFB, OH.
  - 7. University of Dayton Library, Dayton, OH.
  - 8. Wright State University Library, Dayton, OH.
- B. Conducted searches for literature through the Defense Technical Information Center (DTIC), DLA, Alexandria, VA and the DIALOG Information Retrieval Service.
  - 1. Requested a search for literature be conducted based on key words and phrases provided by the researches.
  - 2. Based on the technical report summaries, a result of the search, requested the relevant publications.
- C. Conducted an examination of relevant data at the Air Force Historical Research Center, Maxwell AFB, AL.

II. Arranged the data into the following areas:

A. Korean War

1. Army

- a. Forward aeromedical evacuation
- b. Tactical and intratheater evacuation

2. Air Force

- a. Forward aeromedical evacuation
- b. Tactical and intratheater evacuation
- c. Strategic and intertheater evacuation

3. Navy & Marine Corps

- a. Forward aeromedical evacuation

B. Vietnam War

1. Army

- a. Forward aeromedical evacuation
- b. Tactical and intratheater evacuation

2. Air Force

- a. Forward aeromedical evacuation
- b. Tactical and intratheater evacuation
- c. Strategic and intertheater evacuation

3. Navy & Marine Corps

- a. Forward aeromedical evacuation

III. Evaluated the data with emphasis on showing the relation of the data with the specific problem statement.

A. Evaluated external criticism (validity)

B. Evaluated internal criticism (validity)

- 1. Examined versions of same events by different individuals for similarities and differences. Was the variation in the data explainable?
- 2. Did the account of the historical events include interpretations of the data presented. What was the basis for the translations of the data?

3. Examined the meaning of particular events and established a meaningful relationship, if there was one, to the specific problem (14:252).

An extensive DTIC search provided numerous documents concerning Army aeromedical evacuation in the Vietnam War. There were no documents found through DTIC concerning aeromedical evacuation in the Korean War. A DIALOG search failed to provide any documents. Articles and books containing information from all the services on aeromedical evacuation from both wars were obtained from the libraries previously identified. Most of the information of aeromedical evacuation by the Air Force was found in the records of the Air Force Historical Research Center. Unit histories and commander end of tour reports contained vital information.

### Presentation

This thesis examines aeromedical evacuation in the Korean War and the Vietnam War in three chapters.

Chapter III. This chapter examines aeromedical evacuation in the Korean War during the time period from 1950 to 1953. The military services examined in this chapter are the Air Force, Army, and Navy.

Chapter IV. This chapter examines aeromedical evacuation in the Vietnam War during the time period from

1965 to 1973. The military services examined in this chapter are the Air Force, Army, and Navy.

Chapter V. This chapter compares and contrasts methods of aeromedical evacuation used in each war. The chapter closes with conclusions based on the comparisons and provides recommendations to improve, and prepare for, aeromedical evacuation in future wars.

### III. Korean War

#### Introduction

In 1950, prior to the outbreak of the Korean War, Dr. Richard Meiling, Chairman of the Armed Forces Medical Policy Council said;

As a peacetime operation, the air transportation of patients is steadily improving in efficiency. As a military operation under combat conditions, a lot of improvement is still required. There still . . . is the small minority which is unable or unwilling to recognize the inherent soundness of air evacuation.

Though the resistance was difficult to understand, the reluctance of many to use aeromedical evacuation during the beginning of the Korean War caused it to take some time for an orderly system of aeromedical evacuation to be established. Many Army, Navy, and some Air Force personnel believed that ships and ground transportation were the best ways to evacuate the wounded. Inadequate roads, rail, and port facilities in Korea made aeromedical evacuation a very reasonable and essential option, but it was still resisted by many people. The lack of infrastructure and adequate medical facilities helped to establish aeromedical evacuation as the necessary course to take (64:104).

Another proponent of aeromedical evacuation, General Wilford F. Hall, USAF, wrote in 1951;

The indirect advantages of having air evacuation serving the military is not unlike the resultant medical advantages of good country roads and the

automobile to the farmer over the horse and buggy days of 30-40 years ago. Today, most people living in rural areas are equipped with fast motor cars and connected to one of several towns with excellent all-weather roads. The sick or injured of these households may be promptly and quickly brought to the doctor in the city, who has all the advantages at hand of his complete office equipment, consultants and professional assistants and hospital facilities. Medical advantages to the patient are obvious. The ability of the doctor to see more patients and do a better work are likewise obvious. With a requirement for the deployment of our military forces on a global scale, the air ambulance is a potent factor and a modern piece of our medical armamentarium for providing better medical care to all by fewer physicians (35:1026).

In the early stages of the Korean War aeromedical evacuation was thought of as an emergency method of transporting the wounded. It was used only in those cases when the injured could not be transported by means of stretcher bearers, field ambulances, trains, or hospital ships. The Army's policy was to keep the injured soldier as far forward as possible so he could return to combat as soon as possible. The medical system and its transportation methods were focused on keeping the injured soldier forward (30:584-585).

Even though it was recognized that aircraft offered the cheapest and fastest way to move patients from Korea to the United States, neither the Army nor the Air Force had given any thought to the concept of aeromedical evacuation of sick and wounded within the theater of operation. The Far East Air Forces (FEAF) did not provide a regulation governing intra-theater aeromedical evacuation until 18 December 1951;

18 months after the start of the war. The directive did little more than confirm the policies and practices which had evolved through experience in the war. Aeromedical evacuation gained wide-spread acceptance not through the regulations but through it's proven usefulness (30:585).

#### Types of Injury and Disease Encountered

During the Korean War the United Nations suffered 142,000 casualties. The Koreans lost at least one million people. The losses by the United States in Korea in three years are narrowly less than the losses in the Vietnam War, over ten years. The British lost three times as many people in Korea than in the Falklands. Chinese casualties are uncertain, but are into many hundreds of thousands (36:9).

The injuries incurred in a war time situation, as well as the kind of diseases individuals are exposed to, have a definite impact on the type of medical evacuation that is used. of Army evacuation to the United States, 51 percent were wounds, 34 percent were disease cases, and 16 percent were non-battle injuries (61:75).

Table 1 displays that explosives and fragmentation weapons accounted for 59 percent of those U.S. Army personnel medically evacuated to the U.S. from Korea. Explosive projectile shells (which included artillery, mortar, and bazooka shells, plus unspecified explosive projectile

shells) were responsible for about 41 percent of the casualties evacuated.

TABLE 1 (61:78)

U.S. ARMY WOUNDED EVACUEES RECEIVED IN THE UNITED STATES BY CAUSATIVE AGENT 2 Sept 1950 - 31 Dec 1953		
Causative Agent	Injury and Wound	
	Number	Percent
Total all agents	19,465	100.0
Small arms weapons (subtot)	(6,460)	(33.2)
Rifle bullet	934	4.8
Machinegun bullet	602	3.1
Others unspecified bullets	4,924	25.3
Explosive and fragmentation weapons (subtotal)	(11,559)	(59.3)
Rifle artillery	18	0.1
Specified projectile explosives	3,357	17.2
Unspecified projectile explosives	4,734	24.3
Bombs and other air launched missiles	19	0.1
Land mine	899	4.6
Grenade	1,232	6.3
Other or unspecified fragments	1,300	6.7
Parachute jump and aircraft accidents	29	0.1
Land transport vehicles	184	0.9
Incendiaries and other chemical weapons	52	0.3
Direct or indirect intended effects of war	341	1.8
Self infliction	640	3.3
Falls or jumps	128	0.7
Machinery, tools, objects	35	0.2
Other agents	37	0.2



The proportion of wounds caused by small arms weapons was higher in the Korean War than in World War II. Reister points out the reason is that in the Korean War there was less enemy aerial activity in support of their ground troops thus making bombs and other air launched explosives not as significant a factor as a cause for casualties (61:78). Of all of the traumatisms or injuries of the 19,465 U.S. Army evacuees, 85 percent were in two main categories: Compound fractures were about 50 percent while wounds of all types accounted for about 35 percent. Table 2 shows the distribution by type of traumatism.

TABLE 2 (61:79)

NUMBER AND PERCENT OF U.S. ARMY WOUNDED EVACUEES BY TYPE OF TRAUMATISM (2 SEPT 1950 - 31 DEC 1953)		
TYPE OF TRAUMATISM	NUMBER	PERCENT
Total	19,465	100.0
Fracture, Compound	9,687	49.8
Fracture, other, or not elsewhere classified	956	4.9
Wounds	6,868	35.3
Amputation. traumatic	708	3.6
Burns	85	0.4
Concussion	77	0.4
Other or unspecified	1,084	5.6

#### Chain of Evacuation in the Korean War

Aeromedical evacuation was only a part of the overall evacuation process in the Korean War. A general understand-

ing of the evacuation process is necessary to appreciate the role of aeromedical evacuation played in the process. This section will generally address the chain of evacuation with a more detailed analysis of the aeromedical evacuation discussed later.

Figure 1 shows the medical evacuation flow chart for the Army in the Korean War. The flow was also similar for the Marine Corps and downed Air Force pilots. Air Force personnel in Korea were usually close to medical facilities therefore this flow did not apply. The injured soldiers from the front lines were initially brought to battalion aid stations by litter, jeep, or ambulance. There the wounded received first aid and emergency treatment and were moved by jeep or ambulance to collecting stations. Critically wounded patients were flown by helicopter to a MASH (Mobile Army Surgical Hospital). Other patients went by ambulance to the Division Clearing Stations. From the Division Clearing Stations patients were sent by air or train to evacuation hospitals. Some of the patients went from the evacuation hospitals by air to Japan while others went by ship. In Japan, most patients went to the hospital at Fukuoka, the point of debarkation, but some were transported by rail, ambulance, and air to other hospitals in Japan. Patients who could be treated and returned to duty remained in Japan. This was usually the case if the patient's hospital stay was expected to be 120 days or less. The more serious cases

# ARMY MEDICAL EVACUATION FLOWCHART

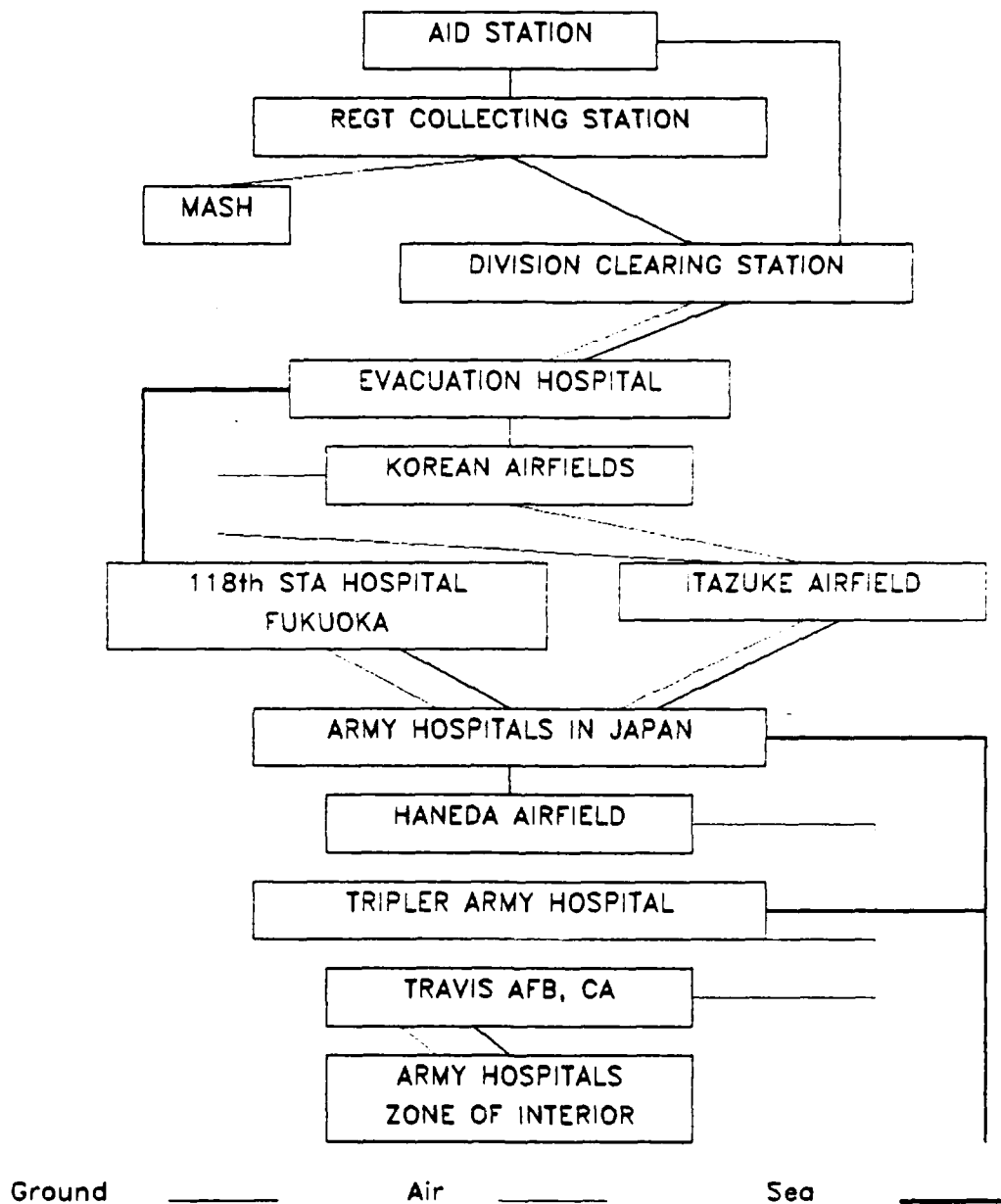


FIGURE 1

were flown back to the United States. In some circumstances non-serious cases were evacuated to the United States because of the immediate lack of bedspace in the hospitals in Japan. Patients scheduled for hospitalization in the United States were evacuated as soon as their physical condition would permit. The bulk of the patients who were evacuated to the United States were flown out of Haneda Field near Tokyo. Enroute to the United States, some patients were left for treatment at Tripler Army Hospital in Hawaii while the others continued to Travis AFB for treatment and distribution to other hospitals throughout the United States (11:51).

#### Aeromedical Evacuation Process in Korea

The Eighth Army began a traditional system for moving and hospitalizing the sick and wounded when American troops landed in Korea in July, 1950. The policy was for patients who could return to duty within thirty days to be hospitalized in Korea. Patients who required specialized treatment or more than thirty days hospitalization would be moved to hospitals in Japan (30:585-586). Lt. General Stratemeyer, Commanding General of the Far Eastern Air Forces (FEAF), recognized that the speed with which a wounded person received medical attention often determined if he lived or died. He was also very familiar with Korea's limited surface transportation. He informed General MacArthur, on 4

July, 1950, that FEAF was ready to accomplish the aero-medical evacuation of casualties from Korea. During July and August of 1950 there was little use made of this aero-medical evacuation system. From the beginning of the war to September 15, 1950, 13,015 wounded were evacuated from Korea, but only 3855 (29.6 percent) were evacuated by air, even though 36,000 wounded could have been flown out on empty cargo planes (18:12-13). Because of the rough roads between Taegu City and Taegu Airfield, the Eighth Army chose to move its wounded south by train to the evacuation hospital in Pusan. Most of the patients evacuated from Pusan to Japan went by ship. Patients were sometimes taken to the Pusan Airfield for evacuation. The airfield had no facilities for patients and patients often had to wait for very long periods before air transportation was arranged. The Eighth Army stated it could not afford to count on this type of air evacuation and therefore would use more reliable evacuation methods (30:586).

With the creation of the FEAF Combat Cargo Command on August 26, 1950, the commander, General Tunner, directed his staff to study the aeromedical evacuation situation. Up to this point, aeromedical evacuation in Korea had a very unreliable record even though the war was only two months old (18:12-13). As the war went on aeromedical evacuation increased.

The aeromedical evacuation process in the Korean War can be divided into four categories; forward aeromedical evacuation; intratheater aeromedical evacuation; inter-theater aeromedical evacuation; and aeromedical transportation of the wounded within the United States. All but aeromedical transportation within the United States was covered in this research. Helicopters and other aircraft of the 3d Air Rescue Squadron, Military Air Transport Service (MATS), and other similar units, retrieved and removed injured and wounded personnel from the front lines to MASH or other medical facilities. C-47s, C-54s, and other aircraft carrying medical personnel from the 801st Medical Air Evacuation Squadron, 315th Air Division (Combat Cargo), and other units, transported patients, if required, to further locations in Korea and Japan. C-54s, C-9s, and other aircraft with medical personnel from the 1453d Air Evacuation Squadron, MATS, transported patients from Japan to the United States. Other elements of the MATS system then carried them to their final destination within the United States (76:34).

Forward Aeromedical Evacuation. Almost all of the forward aeromedical evacuation of the wounded were accomplished by helicopters. Fixed wing aircraft couldn't be used because generally there was no landing facility. The primary mission of the helicopter in the Korean War was search and rescue. This research only covered the helicopter's aero-

medical evacuation mission even though there is some overlap between the two missions. Making the helicopter the basic tool for medical evacuation was one of the most important logistical innovations of the Korean War (20:93). The missions assigned the first helicopters in Korea were to fly high ranking officers from one location to another. This was generally forgotten as the mission was changed to evacuation and rescue work in the first weeks of the war (44:20).

The incident which changed the mission of the helicopter in Korea occurred in August, 1950. An Air Force helicopter detachment was notified of a seriously wounded soldier at a front line aid station on top of a 3000 foot mountain. The aid station was cut off from the rear. The mission was to fly in and evacuate the soldier. The evacuation was successfully accomplished and the soldier's life saved. The following day the primary mission of helicopters was changed to rescue and evacuation (44:20).

The quick adoption of helicopter aeromedical evacuation was a result of both the nature of the Korean War and the Korean countryside. The broken and rugged terrain separated troops from each other and from medical facilities. The poor infrastructure, and the guerilla warfare tactics used by the enemy, also contributed to the problem. The few roads were rough and crowded through over-use making the ground movement of wounded traumatic, slow, and full of problems for the injured. In contrast, the helicopters

flight was fast and generally much smoother causing less trauma to the already injured patients (44:21).

The Air Force accomplished most of the helicopter aeromedical evacuations in Korea. The following is a memo to the Surgeon General from Brigadier General Jarred V. Crabb, Deputy for Operations, Headquarters FEAF.

Until 1 January 1951, all helicopter evacuations were performed by the USAF, except within the 1st Marine Division. The Marines handled their own evacuations except in isolated cases where help was needed they called on the Air Force. There have been 1394 personnel picked up from front line and behind the enemy line areas by USAF helicopters. Percentages of USAF versus Marine Corps or Army helicopter pickups are not available. This was discussed with the Eighth Army Surgeon and he stated the Army did not keep a consolidated record of evacuations. It is the opinion of operations personnel, Fifth Air Force, that 85 percent of all evacuations are performed by Air Force helicopters (4:20)."

The Marines first regularly used helicopters for aeromedical evacuation in November 1950 and the Army in January 1951 (64:104).

In August of 1950 the evacuation of patients was begun by Detachment F of the 3d Air Rescue Squadron whose primary mission was to retrieve downed pilots (64:104). This detachment was under the command of Captain Oscar N. Tibbets. With the drive into North Korea, the detachment moved north and then retreated south with the United Nation forces. At the end of 1951 the unit stationed itself at Yongdungpo near the Seoul airfield. On 22 June, 1951 the unit was reorganized as Detachment 1, 3d Air Rescue Squad-



ron. It was augmented with enough people to run a rescue control center. Between 25 June 1950 and 30 June 1952 the unit picked up and evacuated 5258 personnel of which 4573 were evacuated by the H-5 helicopter alone (20:94).

During the fall of 1950 and spring of 1951 the 3d Air Rescue Squadron helicopter crews continued to perform most of the front line aeromedical evacuations. The squadron had SB-17, SB-29, SA-16, C-47, H-5, and L-5 aircraft. There were many maintenance problems principally caused by trying to maintain so many different types of aircraft at one time in a small unit. The four SA-16s which arrived on 28 July 1950 were all down at one time due to lack of parts, for example. The H-5 helicopters were used primarily for aeromedical evacuation because ambulance travel over existing and hastily made roads was dangerous and slow for the wounded, as earlier stated. The helicopter was able to carry two patients and a medical technician (77:111). The helicopters were normally located at a MASH and dispatched to the front lines by the surgeon in charge. There were not enough H-5 helicopters to meet all evacuation needs so they had to be used discretely thus involving the chief surgeon. Helicopter evacuation was used when a soldier had a head wound, chest wound, or stomach wound, because the speed with which such wounded persons received medical attention determined their chances for survival (30:589).

With I Corps, the following procedure was used by Detachment I. A battalion aid station notified the surgeon's office at I Corps of the location of the wounded soldier. Using direct communication with the 8055th MASH, the I Corps surgeon gave the element commander the exact coordinates, the type of wound, security status of the area from enemy attack, and the type marker to be used. The pilot and the medical technician then made the necessary pickup (77:247-248).

Wounded who were evacuated by helicopter from the front lines were often in surgery within an hour (30:589). Although the helicopters were not equipped for night flying, one pilot responded to a call to a clearing station late one night. He flew using a flashlight to see his instruments and landed in a circle lit by jeep headlights. Helicopter pilots also provided aeromedical evacuation for paratroop drops north of Pyongyang on 20-22 October 1950. Assistance was also provided by other liaison planes and, during the two days, 47 casualties were evacuated (77:111).

The Eighth Army Surgeon said that half of the 750 critically wounded soldiers evacuated on 20 February, 1951 would have died if they had been moved by surface transportation. General Stratemeyer also had nothing but praise for the Air Rescue helicopter pilots. He also continued to insist that air evacuation should be separate from air rescue. On 16 January, 1951 in Tokyo, General Stratemeyer gave

General Hoyt S. Vandenberg, USAF Chief of Staff, a requirement for 31 additional helicopters for Korea. Most of these were to be used to establish a provisional helicopter squadron. Headquarters USAF was unwilling to take any more H-5s for the Air Rescue Service and the new H-19s and H-21s would not be available until early 1952. On 11 March 1951 General Stratemeyer asked General Vandenberg to equip the Fifth Air Force with a liaison squadron for Korea. He asked it be authorized 12 H-5s and 12 L-5s. The squadron would be responsible for air evacuation missions. On 14 July the USAF authorized the Fifth Air Force to activate the liaison squadron with 12 L-5s and also told FEAF the Air Rescue Service would have first choice on all helicopters received from production. On 24 July 1951, FEAF made a third request, insisting that they required a squadron of H-19 helicopters assigned to the 315th Air Division for front line aeromedical evacuation missions. The USAF told FEAF that no liaison or helicopter units were available or even programmed for deployment to FEAF. On 25 July, 1951 the Fifth Air Force activated the 10th Liaison Squadron at Seoul Airfield. This unit had no helicopters so could not perform aeromedical evacuation missions for the Eighth Army. It was limited to performing courier and light-transport duties for the Air Force (30:589-590).

The Army and Air Force Agreements concerning Army aviation made on 2 October 1951 and 4 November 1952 made the

Army responsible for "battlefield pick-up of casualties, their air transport to initial point of treatment, and any subsequent move to hospital facilities within the combat zone." The Air Rescue helicopters continued to evacuate some of the front-line casualties (30:590).

Colonel Chauncey E. Dovell, Eighth Army Surgeon, was very interested in the helicopter as an evacuation tool. He requested an Air Force helicopter on loan for a test. In a test on 3 August, 1950 the helicopter flew with Dovell from Taegu to the 8054th Evacuation Hospital in Pusan. Dovell started a campaign to have helicopters under his own control and received support from his superiors. In October 1950, U.S. Army Surgeon General Bliss visited the Far East Command and discussed medical evacuation problems with General MacArthur. General Bliss reported to his staff that "MacArthur feels that helicopters should be in the T/O&Es (Tables of Organization and Equipment) and should be part of medical equipment - just as an ambulance is". The Surgeon General requested two helicopter ambulance companies of twenty-four helicopters each. By 20 October 1950, eight helicopters had been purchased by the Army for immediate airlift to the Far East Command (20:95).

By March 1951 the Army's 2d Helicopter Detachment had four helicopters that flew from the 8055th MASH. The 3d Helicopter Detachment with three machines was attached to the 8063d MASH, and the 4th Helicopter Detachment had four

helicopters which flew from the 1st MASH. One of the major problems identified with the Army helicopter aeromedical evacuation system was communication. Calls from forward units for helicopter assistance had to go to headquarters and back through poor communications systems for approval. This caused a delay in the quick response which could have been possible (20:165).

The Marine Corps used helicopters to evacuate Marine ground casualties in the Inje area of Eastern Korea. The casualties were brought by the Marine helicopters to a forward airstrip at Pupyong-ni (30:590).

One of the major problems that plagued the helicopter during the Korean War was the lack of parts. At the beginning of the Korean War, industry was not geared towards the production of helicopter parts. The fine tolerances of many of the rotating parts in the helicopter and the limited potential for commercial use, made American industry unwilling to devote large amounts of resources and money to such a speculative investment. Once production did increase there was a problem of transporting the large quantities of supplies to Korea from the United States. By late 1952 there were more than 800 helicopters (medical and nonmedical) competing for available parts. Harry S. Pack identified another problem in an evaluation of the problems of helicopter evaluation in Korea:

The basic concept of the employment of the helicopter...is its increased speed over other forms of transport currently in use in the movement of personnel and materiel. Therefore, it is only logical that the entire helicopter program, including maintenance and supply procedures, should follow the same philosophy of speed and mobility to ensure receiving maximum value from the helicopter (22:17).

Intratheater Aeromedical Evacuation. The intratheater aeromedical evacuation of patients was the responsibility of FEAF's air transport services. When the Korean War started in June 1950, the 801st Medical Air Evacuation Squadron had been stationed at Tachikawa, Japan since earlier in the year. There were only a few nurses and a very small workload since there were no wounded. In July 1950, the Army's 24th Division soldiers were airlifted into Korea and many were killed and wounded. This began a much larger requirement for aeromedical services (72:49). Major Charles Peterson was responsible for the initial organization of air evacuation out of Korea. In July 1950, at Taegu, Peterson, with a few airman operating out of tents, attempted to organize an aeromedical evacuation system. Nurses were sometimes available but often times not. Pilots bringing in cargo took out the wounded who were waiting. Nurses and medical technicians worked around the clock, sometimes as long as 72 hours straight. Nurses provided medical attention to the patients and advised pilots on proper altitudes for flying to accommodate the requirements for particular patients. Flying quickly was always important, but at other

times flying smoothly was more important (72:54). Colonel Allen D. Smith became flight surgeon and commander of the 801st Medical Evacuation Squadron in the fall of 1950 (72:49). During the first three months the aeromedical evacuation process was not well organized because of the lack of personnel; inexperienced personnel and inadequate supplies and equipment; and the absence of a theater directive or policy on medical evacuation (66:).

Under the management of the Fifth Air Force, the 801st Medical Air Evacuation Squadron using mostly 374th Troop Carrier Wing transports flew 1159 patients from Korea to Japan from the beginning of the war to 18 August, 1950. When the Combat Cargo Command took over FEAF transport activity they said that air evacuation from Korea had "a rather spotty history". The air capability was not being fully used because the airfield at Taegu was eight miles from town and was joined by a very poor road. The Eighth Army, which had a shortage of ambulances, preferred to put its patients on a train at Taegu, move them to Pusan, and have them wait for surface transportation. Some of the patients flew from Pusan's east airfield but often had to wait for extreme amounts of time (77:108-109). A memorandum by Colonel Allen D. Smith and Major Charles Peterson depicts the hostility apparent at the time between the Air Force and Army.

The Army complained that it was short of ambulances and that airstrips were too far from hospitals. Also, that aircraft were not scheduled to suit their needs. The Army, however, gave no consideration to locating hospitals where they would be readily accessible to airstrips. An additional factor was the inadequate selling of the advantages of air evacuation to the Army by the Air Force. This was absolutely necessary since the Eighth Army Surgeon was distrustful of air transport and loathe to diverge from old established practices (66:).

A more orderly procedure was brought about through a visit by Colonel Clyde L. Brothers (FEAF Surgeon), Lt. Colonel F. C. Kelley (Fifth Air Force Surgeon), and Major George Hewitt (Cargo Command's Assistant Director for Transportation). They planned to initiate a steady flow of 450 evacuees out of Korea daily. Their plan was to have patients delivered to Pusan by train where they would be moved to waiting planes by ambulance. The patients would then be airlifted to Itazuke, Japan for temporary hospitalization at the 118th Station Hospital. Other aircraft, principally C-46s would move the patients to the Tokyo area. To move the more serious cases a special C-54 airlift was provided directly from Pusan to Tokyo. Some patients were also flown directly to Itazuke from Taegu and Pohang (77:108-109) (See Figure 2).

Care for the patients was provided by the 801st Medical Air Evacuation Squadron, in Japan, which was attached to the Cargo Command for temporary duty. Six flight nurses and six medical technicians were assigned to the Korea flights and



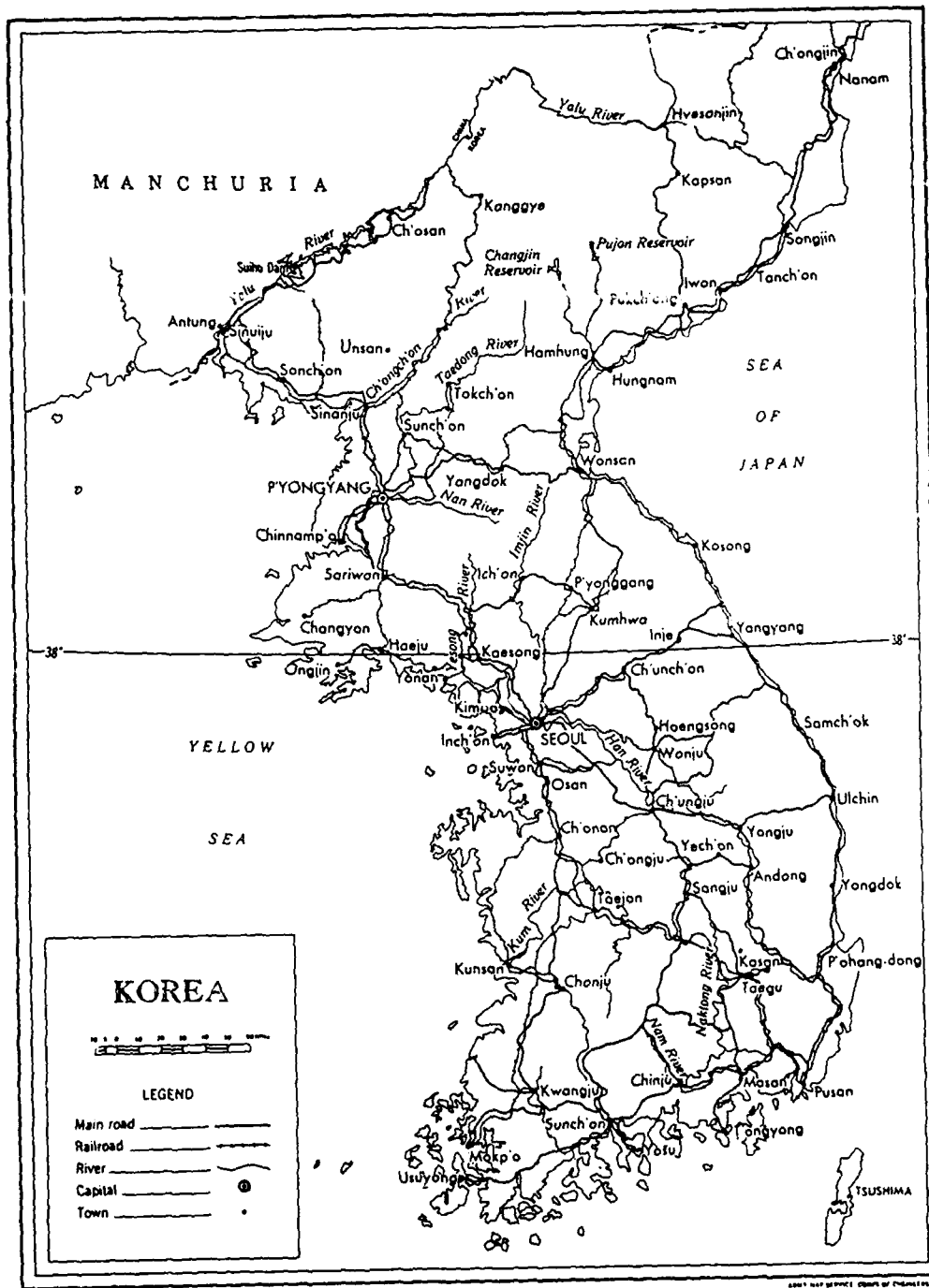


FIGURE 2. MAP OF KOREA

twelve of each to the flights to Tokyo. The number of patients on each flights was about the same but the flight to Tokyo was about three times as long. Another decision was to not commit any special transport crews to air evacuation but to brief all crews on the standard procedures. The trip out of Pusan would use C-46s and C-47s and from Inchon C-54s would be used. The C-119s were not used because their greater capacity was needed for cargo (77:110).

Intratheater air evacuation was divided into three parts: within Korea; Korea to Japan ; and within Japan. An example of the monthly breakdown of the numbers of intratheater patient airlifted by FEAF from 1 July 1950 to June 30 1952 is shown in Table 3.

TABLE 3 (78:241)

MONTHLY MEDICAL AIR EVACUATION IN FEAF			
Month	1950	1951	1952
January	.....	10,301	5,541
February	.....	18,137	5,584
March	.....	12,451	5,345
April	.....	10,693	3,847
May	.....	11,051	4,593
June	.....	14,811	4,789
July	831	5,965	.....
August	800	5,556	.....
September	7,243	11,869	.....
October	5,877	12,718	.....
November	13,880	7,023	.....
December	20,316	6,249	.....

Under the Eighth Army system, patients who required more than thirty days hospitalization were flown to Japan.

Patients who were scheduled for Japan were also screened so that head and chest cases went to the Tokyo area, frostbite and hepatitis to the Osaka area, and other cases requiring long hospitalization but with no complications went to the Fukuoka (Kyushu) area. The Division Surgeon tried to get this screening done at the forward airstrips to permit more direct transportation and reduce the enroute time taken, but Eighth Army approval was not received (73:101).

A lot of coordination was necessary in order to make this process work smoothly. The Division Surgeon had to work closely with Transport Movement Control (TMC). An air evacuation section was established within the Surgeon's Office. At noon every day the Eighth Army medical evacuation officer at Pusan notified the Division Surgeon of the number of patients to be moved the following day. Other information from the 801st Liaison Officer at Taegu gave the types and numbers of cases to be moved to Japan and the number of aircraft needed for evacuation from forward airstrips the next day. This information was based on the battle situation and the number and status of patients in forward field hospitals. In Japan similar notification was made by the Hospital Regulating Officer (Japan Logistical Command) of the next day's intra-Japan evacuation requirements. All of this information was received by noon and, based on this information, the Surgeon's Office submitted to TMC a request for aircraft type, pickup point, destination,

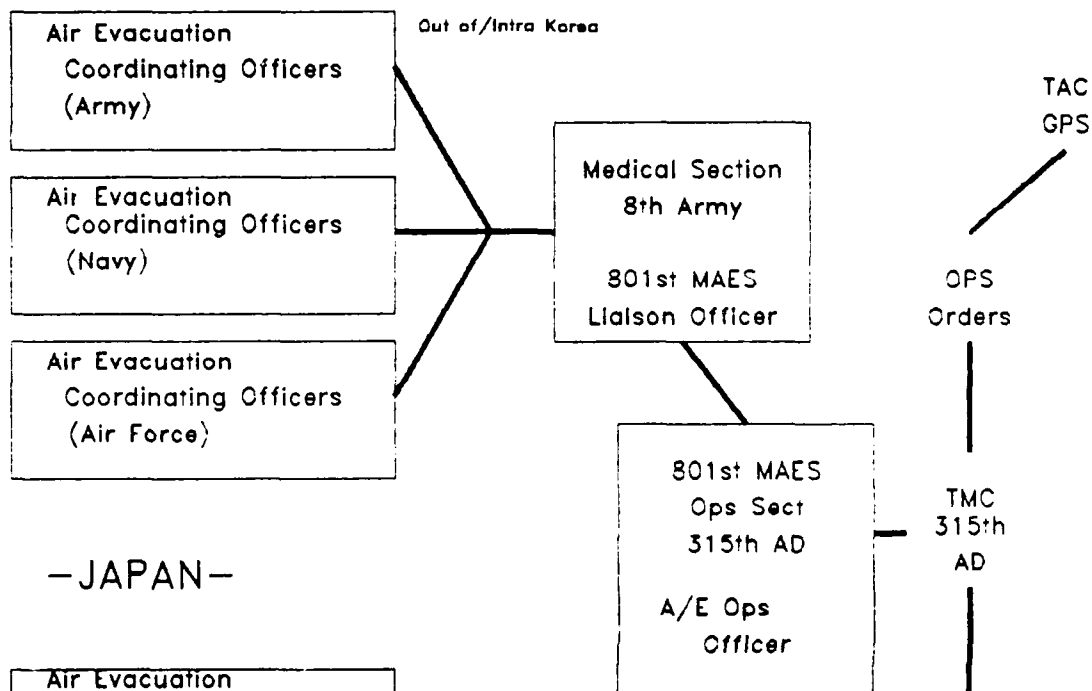
and loading time. The TMC then put the requirements into its schedule for the next day with high priority. Later in the day and evening further transport requests were made if required based on new information (73:101-102). Whenever possible medical equipment, nurses, and technicians were added to aircraft which delivered cargo in Korea and which might pick up evacuation patients (30:587). Figure 3 shows the flow of requests for intertheater aeromedical evacuation.

This procedure was designed to hold to a minimum requests for additional aircraft and to aid in the rapid airlift movement of patients. Flights sometimes had to be canceled because Eighth Army could not always provide firm patient load figures. Flight requests were sometimes made on anticipated patients rather than actual available patients. Some flights were canceled because of bad weather, but every effort was made to fly all schedules (73:101-102).

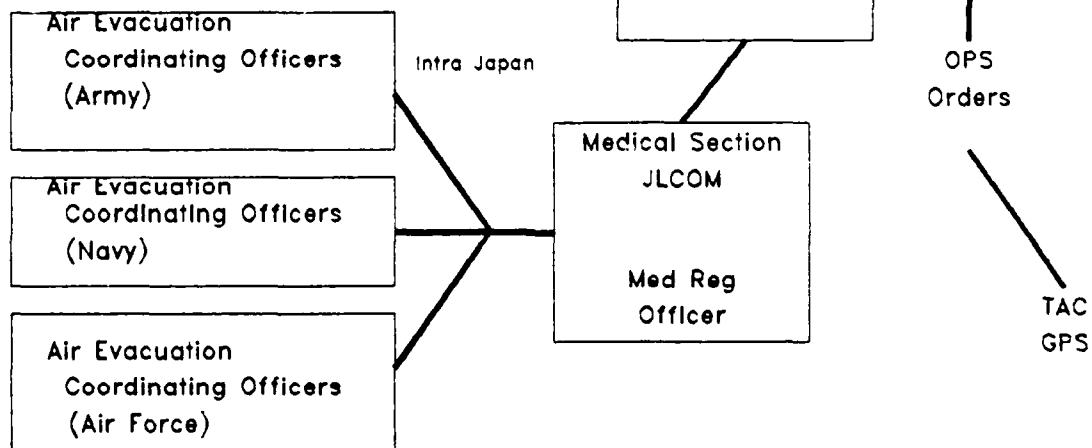
At any time during the Korean War the 315th Air Division was able to support the Eighth Army with all the aeromedical airlift it required. The limiting factor was the small size of the 801st Medical Air Evacuation Squadron which was responsible for the care and handling of the patients. During the critical days in 1950 and 1951 the nurses and technicians flew as many as three roundtrips a day. They worked themselves to exhaustion. On maximum aeromedical evacuation days there were not enough medical

# REQUESTS FOR AIR EVACUATION

## -KOREA-



## -JAPAN-



801st MAES accomplishes liaison and forward requests

A/E Ops Officer coordinates, consolidates requests, and monitors flights

Med Reg Officer regulates the flow of patients out of Korea and Intra Japan

FIGURE 3

personnel to accompany all the aircraft and the aircrews had to care for the sick and wounded they carried (30:593).

In addition to medical care on flights the 801st had a medical service corps officer or senior NCO at each of the airfields where patients boarded and/or disembarked from the aircraft. These individuals served as a liaison with the medical units and supervised the loading and unloading of patients. The staging and holding facilities where patients waited for the airlift were often crude. In the spring of 1951, they consisted of sagging tents in muddy areas. In many instances schedules were delayed because the holding detachment did not have the patients ready when the aircraft arrived. Sometimes airlift requests were cancelled after flights had already taken off thus wasting all the schedule and preparation time. Occurrences like these wasted the time and energy of flight crews, flight nurses, and medical technicians as well as the maintenance and ground service people (30:593).

During September and October 1950 the Cargo Command used centralized control and continuous field liaisons in an attempt to make aeromedical evacuation the normal method of transporting patients in the Far East (30:587). As airfields were secured, the plan was modified. When Kimpo airfield was secured, Cargo Command started an immediate flight evacuation plan in support of the U. S. X Corps. This consisted of a minimum of three C-54s spaced throughout

the day. This lift was supplemented when required. When the airfield at Wonsan was captured the Cargo Command made the Marine Squadron VMR-152 responsible for evacuation directly to Osaka, Japan. On 17 October, 1951, the airfield at Sinmark was opened and C-54s began removing patients to Kimpo where they received medical assistance from the 8055th MASH. On 21 October evacuation began from the airfield at Pyongyang. Here there were difficulties, due to the layout of the runway, since one delayed aircraft could block all others behind it. Other than excessive waiting times at Pyongyang and Kimpo the aeromedical evacuation process was generally well managed (78:110).

In November 1950 the attack of the Chinese Communists, along with the frigid weather, took a heavy toll on soldiers and Marines. In early December 21st Troop Carrier Squadron "Kyushu Gypsy" C-47s moved 4689 wounded or frost-bitten soldiers and Marines from the airstrips of Hagaru-ri and Koto-ri (30:589).

The 21st Squadron evacuated its casualties to Yonpo. Marine R5Ds carried Marine casualties to Itami, and Air Force C-54s evacuated Army soldiers to Fukuoka. Due to the dangerous mission the nurses of the 801st were only on the planes for the aeromedical lifts to Japan. The evacuations were accomplished under enemy gunfire and some medical personnel were injured. One 801st medic was aboard a Gypsy C-47 which crashed on takeoff, landing in enemy territory

about three miles from the airstrip. The technician encouraged the wounded men to help each other back to the airstrip. Immediately on their return to the airstrip they were loaded on another C-47 and evacuated (72:55-56). The medical technicians were responsible for the patients aboard the C-47s. Also in November, in the western part of Korea, nurses and technicians cared for patients from the airfields given up to the communists as the Eighth Army retreated from Sinanju, Pyong-yang, and finally Seoul and Suwon. Flight nurses and medical technicians were on the last planes out of the area, taking care of patients. In early December 1950 the Eighth Army felt the Communists might take over all of Korea and decided to empty all of the combat zone hospitals. On 5 December 1950, 131 flights evacuated 3925 patients. This was the largest day of aeromedical evacuation during the Korean War. In January, 1951 the ground fighting was centered around Wonju, where only C-47s could be used because of the short airstrips at nearby Chungju. At 0945 on 13 February 1951 the Eighth Army reported a requirement for the evacuation of 600 patients from Wonju. Before midnight C-47s diverted from tactical missions and lifted 818 patients from the forward hospitals, including 401 from Wonju. The number of patients needing evacuation from Wonju was slightly exaggerated (30:589). At approximately the same time Eighth Army Transportation Section requested three C-47s to lift Republic of Korea (ROK)



personnel from Kangnung (K-18) to Chungju. Because of the need for the aircraft for the aeromedical evacuation and unavailability of any more aircraft, only one C-47 was allocated for the airlift mission. This raised the issue of relative priorities for aeromedical evacuation operations (73:104). The Far East Command ruled that the diversion was justified. Two days later the hospitals at Pusan were overloaded with casualties and 1325 patients were evacuated. This was another of the busiest air evacuation days in the Korean War (30:589).

During 1950, C-47s accomplished most of the aeromedical evacuation within Korea. The C-54s and C-46s carried most of the patients from North Korea to Japan and from southern Japan to the Tokyo area. The C-54 had the greatest capacity and was the best for longer distances. It was more comfortable, more stable, and had more room for the patients. The C-46 was almost as large but, having only two instead of four engines, was not as comfortable or as dependable to fly in. The C-47 could fly in and out of airstrips none of the other types of aircraft could use and was therefore of particular value in Korea. For example, a C-47 landed on and took off from a short, frozen rice-paddy airstrip at Hagaruri with wounded aboard (72:56).

During the three years of the Korean War the 315th Air Division and its predecessor provided aeromedical evacuation for 311,673 sick and wounded patients and only six patients

were lost. The total evacuated exceeds the number of total casualties, because it included multiple movements of patients within Korea, between Korea and Japan, and within Japan (30:593). As an example, one patient could be evacuated from one hospital to another within Korea, then from Korea to Japan, and from one hospital to another in Japan. This would count as three evacuations. The medical crews of the 801st Medical Air Evacuation Squadron flew more than 12,000 flights, operated out of more than 35 Korean airstrips, and cared for more than 280,000 patients of those moved by the 315th (76:34).

Intertheater Aeromedical Evacuation. The intertheater evacuation was accomplished by the Military Air Transport Service (MATs). At the beginning of the war the 1465th Medical Air Evacuation Squadron (MAES) was evacuating about 350 patients a month from Japan. The MATs evacuation operation soon used the routes, facilities, and aircraft assigned to the Pacific Airlift. Aircraft which transported cargo and personnel to Japan from the United States were aeromedical evacuation flights on the return to the United States. The aircraft, with the regular crew, flight nurses, and medical technicians normally flew through Guam and Kwajalein, or Wake or Midway to Hickam AFB in Hawaii, and finally to Travis AFB, California. On 29 July, 1950 the first C-97 brought 63 litter patients from Tokyo to Travis,

through Wake and Hickam, in 23 hours. On later flights, because of the distance the C-97 could fly, it was possible to eliminate the Wake stop and thus eliminate about 500 miles from the trip. With this schedule the wounded patients knew that home was not far away (77:110-111).

The 1453d MAES was the first USAF organization in the Korean War to receive a Meritorious Unit Commendation (76:38). The commendation stated that the 1453d MAES had distinguished itself by "exceptionally meritorious conduct in the performance of outstanding service from 27 June to 31 December 1950". During this time the squadron had evacuated 16,604 battle casualties over a distance of over 90 million patient miles between the Far East and the United States. The mission was accomplished without a single fatality (76:38). The squadron was credited in the commendation with having saved "many thousands of lives" by its constant innovation and development of air evacuation techniques. This included reducing time in transit, improving medical care, and increasing patient comfort.

Table 4 shows aeromedical evacuation became the primary means of evacuation to the United States during the Korean War.

Members of the Army were evacuated to the U.S. more than any of the other services due to the nature of their duties. Table 5 shows the statistics on the evacuations to the United States broken down by services.

TABLE 4 (61:70)

PERCENTAGE DISTRIBUTION OF EVACUEES RECEIVED IN THE U.S. (2 SEPT 1950 - 31 DEC 1953)			
Type of Personnel	Mode of Transportation		
	Air	Water	Air & Water
All personnel, All areas	93.2	6.6	0.2
Army personnel, All areas	93.4	6.3	0.3
Japan-Korea	95.4	4.3	0.3
All other areas	88.2	11.7	0.1

TABLE 5 (61:70)

EVACUEES FROM JAPAN-KOREA RECEIVED IN THE U.S. BY SERVICE (2 SEPT 1950 - 31 DEC 1953)			
TOTAL	ARMY	AIR FORCE	NAVY AND CIVILIAN
39,568	38,515	516	537
100%	%97.34	%1.30	%1.36

Table 6 shows the U.S. Army evacuation figures for the Korean War, broken down by battle and non-battle injuries. All of the wounded evacuees originated from Japan-Korea. Of each 100 Army evacuees from the Far East Command, 51 were wounded cases, 34 were disease cases, and 16 were nonbattle injury cases (61:75).

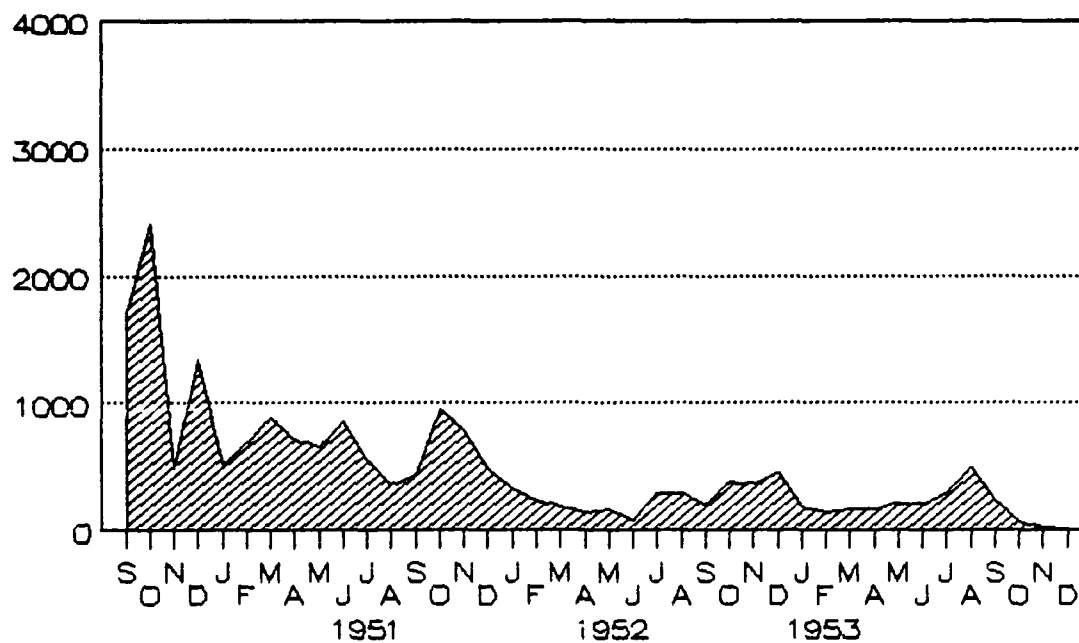
The flow of wounded from the area changed with the combat situation. Figure 4 shows the fluctuation graphically.

TABLE 6 (61:75)

U.S. ARMY EVACUEES (2 Sep 1950 - 31 Dec 1953)						
AREA	BATTLE INJURY		NON-BATTLE INJURY		DISEASE	
	#	%	#	%	#	%
Japan-Korea	19,465	50.5	5,974	15.5	13,077	34.0
Other overseas areas	0	0.0	1,490	10.6	12,607	89.4
Total	19,465	37.0	7,464	14.2	25,684	48.8

The greatest number of wounded evacuees was in September and October of 1950 and then again in December 1950. During the first two months, 75% of the evacuations were due to wounds and in December 50% were due to wounds. In January and February of 1951 nonbattle injuries exceeded the wounded due to more cold weather related cases. With the beginning of the truce talks in July 1951, the proportion of wounded evacuated dropped in August and September, but was still 40 percent of all the evacuees. In October 1951 the number of wounded evacuees rose due to a U.N. offensive to secure Line JAMESTOWN on the western front. In the first 6 months of 1952 the number of wounded evacuees decreased each month to a low of 94 in June 1952. In October of 1952, the Chinese Communist launched their largest attack of the year and the proportion of wounded evacuated rose to 52 percent in the last quarter of 1952. In the first six months of 1953 the percentage of wounded evacuees never exceeded 40 percent.

## Wounded



## Disease and Nonbattle Injury

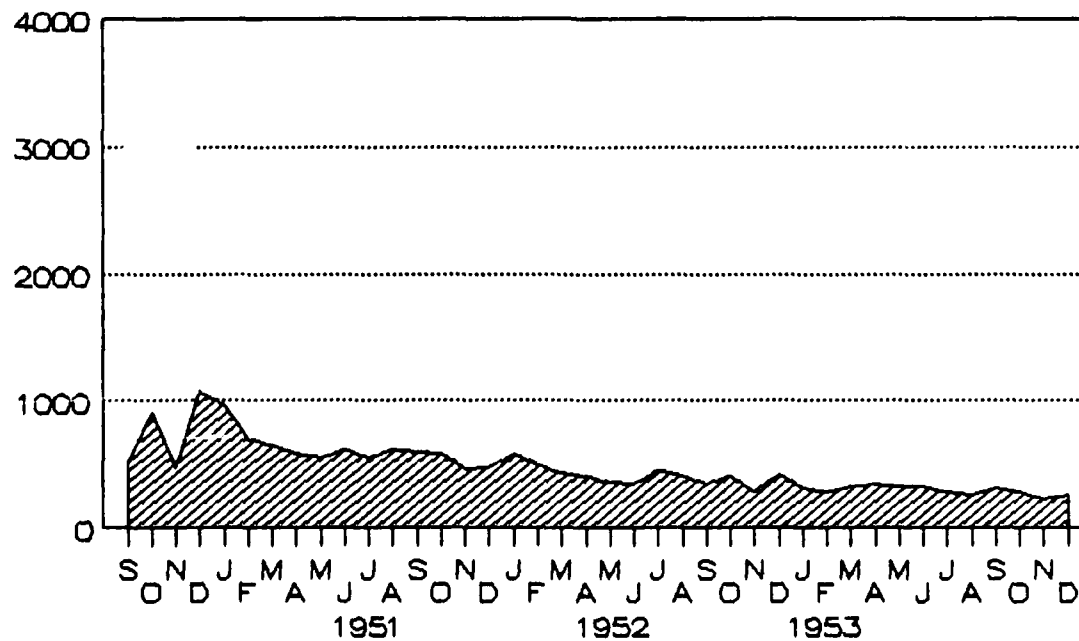


FIGURE 4. U.S. ARMY EVACUEES TO THE UNITED STATES

The percentage increased to 48 percent in July and peaked out at 58 percent in August (61:75).

#### Specific Problems Encountered and Lessons Learned

Many people had high praise for aeromedical evacuation during the Korean War. General Matthew B. Ridgeway, Commanding General of the United Nations Forces in Korea, singled out aeromedical evacuation in the Nineteenth Report of the United Nations Command in Korea to the United Nations Security Council. He said;

High praise must be paid to the elements engaged in evacuation by air of wounded personnel and individuals from behind enemy lines. Countless numbers of soldiers and countless numbers of men who would have become prisoners have been saved by prompt and efficient action of the air rescue and evacuation units. The wounded soldier in Korea had a better chance of recovery than the soldier of any previous war. This was not only by virtue of improved medical treatments available at all echelons, but also in large measure because of his ready accessibility to major medical installations provided by rapid and evacuation (76:).

Other praises included Doctor Elmer L. Henderson, President of the American Medical Association who, after returning from a visit to Far East Air Force medical facilities, described air evacuation as "the greatest thing that has come out of this Korean incident as concerns saving lives" (76:). In 1952 the USAF Office of the Surgeon General said that "responsible medical officers at the front line in Korea estimated that without rapid transportation by helicopter and immediate emergency aid including blood

transfusions, 80 percent of the wounded would have died (76:)."

Another advantage of aeromedical evacuation identified by FEAF was from the humanitarian standpoint. Aeromedical evacuation had an extremely positive effect on a patient's morale. Knowing that he would be carried quickly and in as much comfort as possible to a medical facility, the patient developed a "the worst is over" feeling and his spirits were raised at this difficult time (73:106).

The 315th Air Division Surgeon, in a memorandum to the Commanding General, identified the three major advantages of the aeromedical evacuation system under one agency as:

a. Better control is effected by one agency. A single transport movement can follow all aircraft 100 percent of the time. If there is a weather or mechanical failure the sending agency can be notified immediately if an air evacuation aircraft is to be late. One evacuation agency is easily contacted, resulting in better coordination with using agencies and increased utilization of the available aircraft.

b. More transport is available. By having all cargo aircraft under one command more aircraft are immediately available for air evacuation use. During the height of the Chinese North Korean offensive it was possible to place medical evacuation personnel on transports sent out by this command even though request for air evacuation had not been made, since it was known that due to the severity of the fighting, patients would be available, and many lives were thus saved by this Command having available lift. Had there been many agencies doing the air evacuation such a procedure would have not been possible.

c. Critically short medical personnel are being utilized. There is a saving in medical evacuation personnel when only one organization accomplishes the air evacuation mission. If several organizations were doing air evacuation there would of necessity be a duplication of personnel. This is all the more impor-



tant since medical evacuation personnel are not readily available. After more than a year of combat operation the 801st MAES could still profitably utilize additional well trained technicians (73:108).

The Surgeon made the point that centralized control was a very important factor. He said;

One medical air evacuation squadron working with one transport agency has accomplished more than several squadrons working with more than one transport command (73:108).

Aeromedical evacuation was much faster and more comfortable than evacuation by land or sea. Civilian consultants who accompanied the Air Force Surgeon General on his inspection tour of the Far East in the spring of 1951 compared air evacuation with land and sea evacuation. They stated that evacuation from Korea through Japan would take from three to four weeks by boat and train, but seriously wounded patients could be airlifted to the United States from Korea in 36 hours. The consultants also said that air evacuation was also the most economical method of evacuation since it saved time, required only a few medical personnel enroute, and used space on returning cargo aircraft that would have been empty (76:). Personnel shortages, inadequate helicopter capability, deficient training, and the lack of established aeromedical evacuation procedures all added to the difficulty of these operations. Shortages of nurses in July 1950 caused strains in evacuations and shortages of enlisted medical technicians often made it necessary for them to receive their training on the job. The 3d Air

Rescue Squadron was limited in 1950 to the H-5 helicopter which could only carry two litter patients (76:).

Allen D. Smith compiled a list of the advantages of aeromedical evacuation in Korea. His list included the following;

1. Morale - Patients being evacuating realized that they would receive the best possible medical care in a very short time.
2. Economy of time - Patients were aeromedically evacuated in a matter of hours, not days.
3. Economy of personnel - Evacuation by air allowed medical personnel to remain in fixed locations where more effective medical care could be provided.
4. Economy of material - The use of helicopters and other aircraft reduced the need for forward hospitals.
5. Economy of lives - Patients were transported in relatively smooth conditions, in comparison to the bumpy, dirty surface travel in Korea.
6. Economy of transportation - Moving casualties by air saved ground transportation for use by actual fighting troops. The mobility of the forward unit was also greatly increased by removing the injured from the forward area.
7. Increased range and mobility of air travel over surface travel
8. Economy of the actual dollar - Aircraft were used to transport critical war materials from the United States to the battlezone. On the return trip, patients were evacuated. During September 1951 the 315th Air Division evacuated 11,869 patients a distance of 3,421,166 miles at a cost of 6.6 cents per mile (65:323-332).

There were also problems identified with aeromedical evacuation. Aeromedical evacuation in and between Japan and Korea involved complicated problems of coordination. These

problems took time to solve and FEAF added to the delay by not issuing directives on the subject until December 1951. To add to the confusion communications between Korea and Japan were very poor in the beginning. The lack of good information, concerning aeromedical evacuation needs, received from Korea in Japan made it difficult to properly schedule outgoing cargo aircraft. These aircraft had to be properly configured for the return trip with incoming patients from Korea. Because of this, patients and aircraft often had to wait for long periods of time in Korea, because of lack of space for patients or to reconfigure the aircraft. For these and other reasons, the Army sent many of its patients to Japan by sea (76:).

Responsibility for the various phases of aeromedical evacuation was often vague. It was often unclear who was responsible for the operation of the casualty staging facilities. In February, 1951, the commanding officer of the 801st MAES complained to FEAF in a letter that patients waited in the facilities often without food for long periods of time. He considered the operation of the facilities the responsibility of the sending agency (Army, Navy, or Air Force) but as long as there was no directive the responsibility could not be fixed. Even after the FEAF directive was issued, there were "still many Army and Air Force personnel in wide disagreement on the concepts of how much Air Evacuation should be handled by Army and how much by Air Force

and how much within each of the two Armed Services should be done by different sub commands" (76:).

The system developed near the end of the Korean War was an improvement and was described in part as follows:

The using agency - whether Army, Navy, or Air Force - has only to furnish its air evacuation requirements to an Air Force Air Evacuation Liaison Officer who relays the information to the air evacuation operations officer (HSC) of the 315th Air Division. Here coordination is effected with the Army Regulating Officer, and aircraft flying cargo runs are designated to pick up patients on their return trips, at the time and place specified. Thus air evacuation is integrated with operational schedules. Movement of patients now has the highest priority. In emergencies patients may be moved without regard to cargo (76:).

Many people had high praise for the performance of the helicopter in Korea and many advantages were pointed out.

Spurgeon Neel points out five.

1. The speed with which casualties can be evacuated by helicopter is greater than with any other method.
2. The helicopter is very flexible in that the controlling surgeon can shift the support from one unit to another unit if necessary.
3. The patient is more comfortable since he moved in the shortest time and in the best condition possible by helicopter.
4. The patient can be moved to the treatment facility which can best service him because of the speed, flexibility, and range of the helicopter.
5. The proper use of the helicopter permits economy of use of medical personnel. Since the helicopter will bring the casualties to the doctor, specialized people can be concentrated in forward areas and more and better surgery can be provided with fewer people (53:220-227).

There were also disadvantages of helicopter aeromedical evacuation. Ground forces had to learn that the helicopter had certain limitations it had to operate under. Helicopters could not fly in bad weather, could not land on any type of terrain, and could not then operate at night. Medical personnel had to overcome these among many different obstacles. The marking of landing sites, the transmission of accurate coordinates, and restricting helicopter evacuation to only critical cases were just a few of the solutions (53:220-227).

One of the most useful helicopters used for aeromedical evacuation was the Sikorsky H-5. A problem was that the type in use was no longer in production creating continuing problems with parts and making maintenance very difficult (64:105-106). Another disadvantage described by Neel was the cost. Transporting patients by helicopter was much more costly than using the field ambulance. Cost could be minimized by assuring the helicopters were used efficiently and for severe cases (53:).

The ratio of maintenance time to flying time of helicopters in Korea was about 6 to 1. This had to be considered when planning helicopter evacuations (53:).

FEAF drew the following list of lessons learned from it's experience in the Korean War.

1. In every theater of operations there should be a definite air evacuation plan, and this plan should be given to all units in the command.

2. The air evacuation squadron assigned to the theater should be manned at 100 percent with personnel and equipment at all times.

3. All aircraft to be used for the purpose within the theater should be under a single transport headquarters. The air evacuation squadron should be assigned directly to this headquarters. Such centralization would make more aircraft available and would permit critically wounded personnel to be used more effectively.

4. Medical evacuation should have top priority within the theater.

5. All cargo air evacuation assigned to a combat theater should be properly equipped to do aeromedical evacuation at all times.

6. The Air Force should assume and maintain the responsibility for operating patient holding facilities.

7. A portable aspirator, modified for 24-volt current, should be adapted or an item of equipment authorized to air evacuation squadrons.

8. Only school-trained air evacuation technicians should be furnished to air evacuation squadrons as combat crew replacements. These technicians should be especially designated for this operation prior to departure from the Zone of Interior.

9. A field-grade Medical Service Corps Officer, experienced in all phases of troop carrier operations, should be attached to the office of the theater surgeon in a combat theater of operations (76:).

There was a large difference in air power used by the enemy in the Korean War from other wars in the past. The lack of an air offensive by the enemy made aeromedical evacuation a much easier job than it possibly could have been. With the exception of a few incidents, helicopters were relatively free from enemy air attack. If the enemy in Korea had committed more aircraft to fly in South Korea, the

success of aeromedical evacuation might not have been as great. Scheduled combat cargo planes although fired upon from the ground many times, could have been much easier targets for flying aircraft. Helicopters evacuating casualties under the attack of fighter aircraft, may have found it to be an impossible task while using a hoist, as an example (64:107).

#### IV. Vietnam War

##### Overview

Aeromedical evacuation of casualties was one the major advances of the medical service during the Vietnam War. As previously mentioned, in World War II when very few tactical aircraft were used to evacuate casualties from the field the mortality rate was 4.5 percent. In the Korean War when about one out of every seven U.S. casualties was evacuated by helicopter the mortality rate dropped to 2.5 percent. In Vietnam the actual rate dropped even further, due to the evacuation of the majority of U.S. casualties from front lines by helicopter, evacuation of the seriously wounded by tactical airlift fixed wing aircraft, and out-of-country evacuation by USAF MAC aeromedical evacuation aircraft (68.5:66).

Some problems were caused by the location of the Vietnam War in relation to the United States. Vietnam War was a country halfway around the world. Patients being evacuated to the United States had to fly over 7800 miles to reach Travis AFB, California, and almost 9000 miles to reach Andrews AFB near Washington D.C. The nearest off shore U.S. hospital was located almost 1000 miles away at Clark AFB in the Philippines. The nearest complete hospital was in Japan, 2700 miles away. Within the country, the waterways,



jungles, and lack of infrastructure obstructed the evacuation of patients even without the interference of combat operations (52:xiii).

South Vietnam was divided into four military zones. The northern zone, or I Corps Zone, ran from the demilitarized zone down to Kontum and Binh Dinh provinces. The terrain was almost all high mountains and dense jungles. II Corps Zone ran from I Corps Zone south to the southern foothills of the Central Highlands. This was about 100 kilometers north of Saigon. It included a long coastal plain, the highest part of the Coastal Highlands, and the Kontum and Darlac Plateaus. III Corps Zone ran from II Corps Zone to an area 40 kilometers southwest of Saigon. The southern foothills of the Central Highlands, a few large, dry plains, and jungle along the Cambodian border were in this zone. IV Corps included almost all of the delta formed by the Mekong River in the southern part of Vietnam. It had no forests except for the dense mangrove swamps at the southernmost tip and forested areas just north and to the east of Saigon (19:21). Figure 5 shows the four Corps zones in South Vietnam.

#### Types of Injuries and Disease Encountered

People were evacuated in Vietnam because of either disease or injury. To understand the types of injuries and diseases the aeromedical evacuation process had to deal with

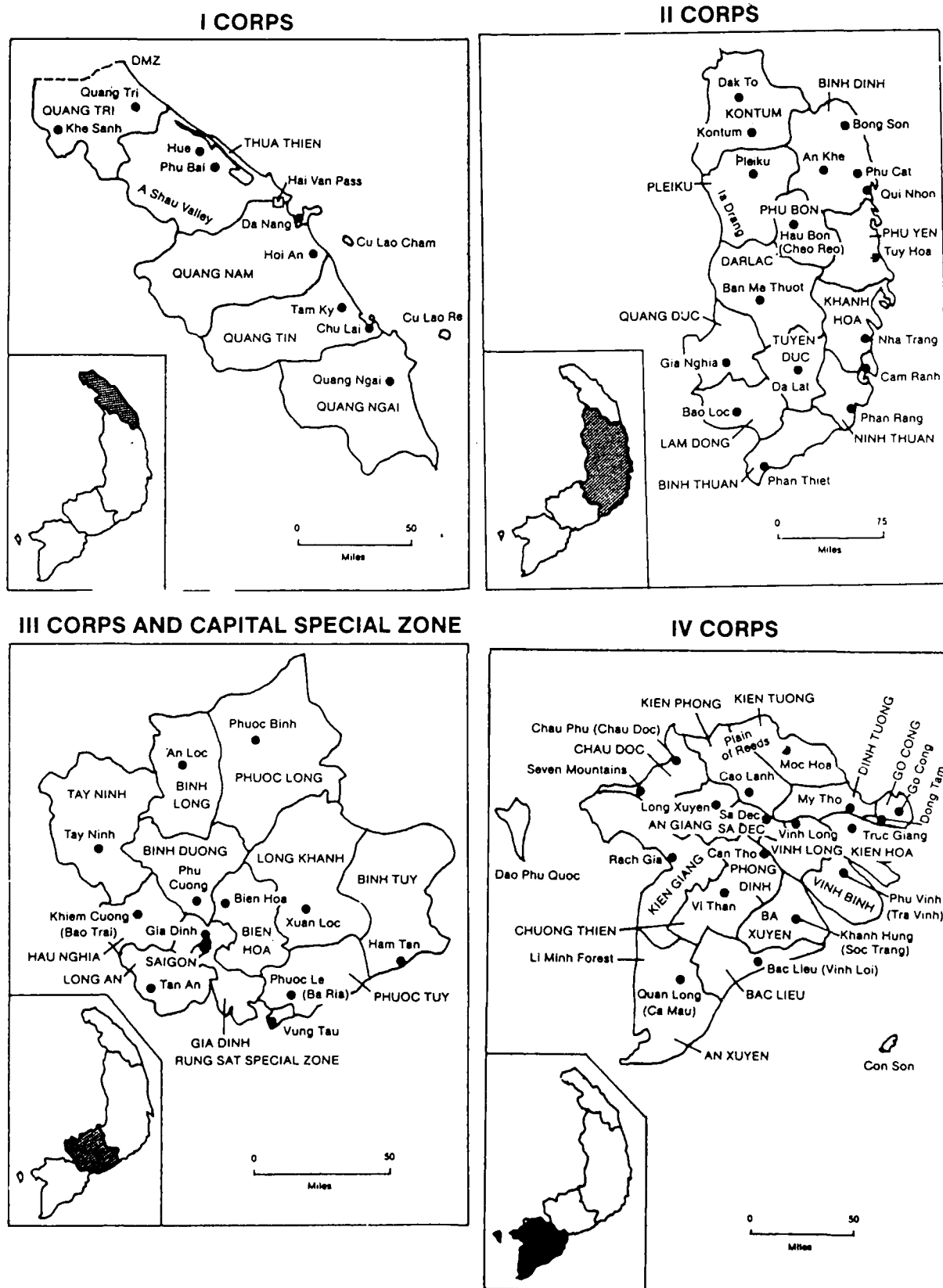


FIGURE 5. FOUR CORPS ZONES IN VIETNAM

this section will describe them and touch on other problems, as well.

Disease. Disease was the biggest culprit in the welfare of Americans in Vietnam. As can be seen in Table 7, approximately 69 percent of all hospital admissions for the Army were due to some kind of disease. Injuries and wounds only accounted for one-sixth of the admissions during this time (52:33).

TABLE 7 (52:33)

HOSPITAL ADMISSIONS FOR ALL CAUSES, U.S. ARMY (VIETNAM) (Rate expressed as number of admissions per annum per 1000 avg strength)					
YEAR	ALL CAUSES	NON- BATTLE INJURY	BATTLE INJURY WOUNDS	DISEASE	DISEASE AS % OF ALL CAUSES
1965	484	67	62	355	73
1966	547	76	75	396	72
1967	515	69	84	362	70
1968	523	70	120	333	64
1969	459	63	87	309	67

The average Army annual disease admission rate for Vietnam (351 per 1000) was about one-third that in World War II (approximately 877 per 1000) and more than 40 percent lower than the rate in Korea (611 per 1000) (52:32). Why was there so much improvement? Neel attributes the improvement to effective disease control. Disease control programs in Vietnam were begun in 1965 and were maintained through the end of the war. This was unlike World War II where

disease control was begun in 1945, near the end of the war, and in Korea where there still was a delay but of less magnitude (52:32). Lt. General Leonard D. Heaton, USA, Army Surgeon General, attributed the improvement to better understanding of the different types of infections and greater efforts in preventive medicine (38:85).

There were many different types of diseases the Army medical services had to fight. Table 8 shows days lost from duty by cause and Table 9 shows hospital admissions by cause. The diseases could be divided into two general groups. Those which affected few people, like hepatitis, but put them out of action for a long time and those which affected many people, like diarrheal and skin diseases, which affected the person only for relatively short periods. Malaria was widespread and put individuals out of action for a long time, a combination of the worst of both groups. Neel points out that as we stayed in Vietnam the rates for diseases like malaria fell as preventive measures were taken. These statistics encouraged disease control efforts and permitted disease rates to be forecast with some accuracy. This could be very valuable for the field commander planning combat operations (52:33-34).

There were problems with the reporting of some of the data depicted in the tables. One of the problems was in the category Fever of Undetermined Origin (FUO). There was a tendency for some medical personnel to include other con-

ditions, such as headache and backache, in this category. In contrast, the statistics on malaria and hepatitis are more accurate since they could positively and specifically be identified in most cases (52:33-34).

TABLE 8 (52:34)

APPROXIMATE NUMBER OF MAN DAYS LOST FROM DUTY BY CAUSE AMONG U.S. ARMY PERSONNEL IN VIETNAM, 1967-1970				
CAUSE	1967	1968	1969	1970
Malaria	228,100	215,400	183,050	167,950
Acute Respiratory Infection	66,800	83,181	63,530	70,800
Skin Diseases (incl dermatophysis)	66,400	64,832	50,790	80,140
Neuropsychiatric conditions	70,100	106,743	125,280	175,510
Viral hepatitis	80,700	116,981	86,460	85,840
Venereal disease excl. CRO cases	55,500	60,132	48,980	45,100
Fever of undeterm origin	205,700	289,700	201,500	203,500
Disease Total	780,800	943,809	762,720	834,540
Battle injury and wounds	1,505,200	2,522,820	1,992,580	1,044,750
Other Injury	347,100	415,140	374,030	309,670

The acclimatization process had a significant effect on the high incidence, short duration type diseases. Brigadier General George J. Hayes, Marine Corps, while speaking at the 1970 Pacific Command Conference said:

. . . there is a time reference with respect to diarrheal and upper respiratory disease and fevers of unknown origin . . . The combination of change in circadian rhythm, and early acquired diarrhea, most certainly of viral origin, lead to about a six week acclimatization period for the troops. After this time

the incidence of such disorders in acclimatized troops decreases to a negligible level (52:37).

The 12-month rotation policy made the rates of these diseases higher because of the continued arrival of unacclimatized people (52:36-39).

TABLE 9 (52:36)

SELECTED CAUSES OF ADMISSIONS TO HOSPITALS AND QUARTERS AMONG ACTIVE-DUTY U.S. ARMY PERSONNEL IN VIETNAM 1965-1970 (Rate expressed as number of admissions per annum per 1000 strength)						
CAUSE	1965	1966	1967	1968	1969	1970
Wounded in Action	61.6	74.8	84.1	120.4	87.6	52.9
Injury (except WIA)	67.2	75.7	69.1	70.0	63.9	59.9
Malaria	48.5	39.0	30.7	24.7	20.8	22.1
Acute Respiratory infections	47.1	32.5	33.4	34.0	31.0	38.8
Skin diseases(incl dermatophytosis)	33.1	28.4	28.3	23.2	18.9	32.9
Neuropsychiatric conditions	11.7	12.3	10.5	13.3	15.8	25.1
Viral hepatitis	5.7	4.0	7.0	8.6	6.4	7.2
Venereal disease (includes CRO)	277.4	281.5	240.5	195.8	199.5	222.9
Venereal disease (excludes CRO)	3.6	3.8	2.6	2.2	1.0	1.4
Fever of undeter- mined origin	42.8	57.2	56.2	56.7	57.7	72.3

Like the Army, malaria and fever of undetermined origin were the major causes of hospitalization for members of the Navy and Marine Corps in Vietnam. The average hospital stay for a patient with malaria was about 31.5 days. From interviews with the patients, it was suggested that their failure to follow proper preventive measures, such as taking Chloro-

quine-Primaquine tablets, accounted for many of the cases (45:278).

Diseases such as malaria, hepatitis, dysentary, and others common to Vietnam did not have the same consequences for Air Force personnel. The noneffectiveness rates due to medical causes were approximately the same in Vietnam as in the United States for Air Force personnel. General Bohannon attributes this to the Air Force's fixed-base operation which was in contrast to the Army and Marine Corps troops who roamed throughout the jungles and swamps exposed to various diseases. The fixed-base environment was more controllable since Air Force personnel had direct control over the environment, water supply, food, housing, and general sanitation (8:24).

The number one cause of disability for Air Force flying personnel in Vietnam was respiratory infection, followed by dermatological conditions. Gastrointestinal diseases, such as upset stomach and diarrhea, were the next most common group of diseases. The immunization program is cited as the major deterrent to these diseases in Vietnam. Nutrition and emphasis on hygiene standards also played an important part in fighting disease (8:24-25).

Wounds. Wounds to Army soldiers in battle were received in many different ways. A breakdown is shown in Table 10.

TABLE 10 (52:54)

PERCENT OF DEATHS AND WOUNDS ACCORDING TO AGENT VIETNAM JAN 1965 - JUN 1970		
AGENT	DEATHS	WOUNDS
Small Arms	51	16
Fragments	36	65
Booby Traps, mines	11	15
Punji stakes	0	2
Other	2	2

Weapons used by the enemy in Vietnam were more advanced than in previous wars and caused different and more serious wounds. The high velocity rounds from M16/AK47 type weapons created much more damage than did the lower velocity weapons of previous wars. The tumbling action of many of the bullets made larger entry wounds. The extensive use of mines and boobytraps also created serious medical problems. Dirt, debris, and everything else entered many of the wounds. This, along with the severity of the wounds, complicating the work of the surgeons (52:53).

Another cause of wounds was the punji stick. The punji stick was a needle sharp bamboo stake with the tip smeared with human waste. The sticks were then put in traps in the ground awaiting unsuspecting victims. When someone would step on this stick and it entered the body, the foot or leg would soon become infected. The infection would travel up the leg if not treated (40:).



Many injuries in the Vietnam War were preventable. Lieutenant Colonel William M. Hannon, Marine Corps, contends the failure to use helmets contributed to many of the injuries. He said,

If our combat troops . . . were to wear a helmet, we believe that about one-third fewer significant combat casualties would need to be admitted to a neurosurgical center here in Vietnam (52:55).

The troops who stayed in one place, such as those from fixed operating bases, usually wore helmets and flak vests. Soldiers who were on the move found the equipment too heavy and hot and usually did not wear it. Some commanders decided not to use the protection because of the reduction in mission capability and the increase in heat casualties (52:55).

#### Aeromedical Evacuation Process in Vietnam

Aeromedical evacuation in the Vietnam War, like the Korean War, was categorized into four separate systems: (1) forward aeromedical evacuation, (2) tactical and intra-theater aeromedical evacuation, (3) strategic and inter-theater evacuation, and (4) domestic flights. Domestic flights were not covered in this research but a brief description of the process is provided to help in understanding the overall aeromedical process.

MAC was responsible for moving patients from their points of arrival in the United States to their final destination. The responsibility of determining a patient's des-

tinuation was with the originating medical facility in conjunction with several regulating agencies. The first agency was the Far East Joint Medical Regulating Office (FEJMRO), in Camp Zama, Japan. If a patient was to be hospitalized in the Far East or Southeast Asia the FEJMRO determined where he would go. If the patient was to go to the United States, the Armed Services Medical Regulating Office (ASMRO), Washington D.C., determined where in the United States that patient was to be hospitalized. When the patient arrived at Travis AFB or Andrews AFB, he was then moved by trunk and feeder flights to his final destination. Trunk flights flew on a schedule between seven main transfer points in the U.S.; Travis, Buckley, Kelly, Maxwell, McGuire, Andrews, and Scott AFBs. At the transfer point nearest his destination hospital he boarded a feeder flight to the final destination. The 375th Aeromedical Airlift Wing Command Post at Scott AFB monitored all trunk and feeder flights. An aircraft took off or landed somewhere in the U.S. every 17 minutes. A "hot line" linked each of the transfer points to the command post at Scott AFB. Status boards were maintained at the command post to show how many patients needed to be moved, where they were to be moved to, aircraft availability, and the progress of each enroute patient (59:18-19). The mission of the 375th was very complicated since it provided access to over 500 airports and more than 600 medical facilities. For the transportation of

the wounded, fourteen C-131s and four C-118s were used (84:98).

Evacuations from the field were usually by Army or Marine helicopters. Intratheater flights moved patients within the battle area and to U.S. hospital bases in Japan, Okinawa, and the Philippines. These flights were the responsibility of the Pacific Air Forces (PACAF). Strategic and intertheater evacuations were the responsibility of the Military Airlift Command (MAC). M.S. White, in a study, illustrated the breakdown of evacuations to the United States for the three services. The study showed the percentages of wounded evacuated to the U.S. as 60 percent Army, 35 percent Navy and Marine Corps, and approximately one percent Air Force (79:782). This is a result of the different missions performed by the services in Vietnam.

Forward Aeromedical Evacuation. If one element of medical logistics were selected to be responsible for increasing the number of lives saved, it would certainly be the helicopter ambulance units. "Dust-Off" was the term given to the aeromedical evacuations performed by these helicopter evacuation crews. Nearly all battlefield casualties were evacuated by U.S. Army UH-1 helicopter ambulances. Air Force helicopters occasionally assisted in these operations (6:280). United States Army Major Patrick H. Brady, Medal of Honor recipient, said;

Dust Off has been one of our greatest assets in Vietnam, not only for the service it provided for our troops but also for the great example it provided for our allies (13:23)."

At the peak of combat operations in 1968, the Army operated 116 of the air ambulances (6:280;52:70). These helicopters transported from six to nine patients at a time. The medical evacuation flights averaged about 35 minutes duration. The crew usually consisted of a pilot, copilot, medical aidman, and the crew chief armed with an automatic rifle. In less dangerous areas, the crew chief was left behind to allow additional space for patients (6:281). Heavy armor plates protected the pilot's seat, cockpit doors, and cabin floor. The Geneva Convention stated that helicopter ambulances should have large red crosses painted on the sides, nose, and bottom. In Vietnam, the crews only painted a small red cross on the nose. The other crosses were painted out because the Viet Cong were thought to use the large red crosses for targets (70:). Captain Ronald F. Hopkins, a pilot in the 2d Platoon, 498th Medical Company, said;

We sometimes felt that VC are aiming particularly at the big red crosses on the side of our chopper, but they're probably shooting at any helicopters they see. At any rate, they do not respect the red cross at all (59:22).

The helicopter brought modern medical capabilities closer to the battle frontlines than ever before. It also provided great flexibility in the treatment of patients.

The helicopters, working with the communication network, made it possible to evaluate the status of patients while in flight and to direct the helicopter to the nearest hospital best suited to the needs of the patient. If a hospital developed a backlog of patients, notification could be sent to the helicopter and it could be redirected to another location (52:70).

The first helicopter ambulance unit sent to Vietnam was the 57th Medical Detachment (Helicopter Ambulance), later nicknamed "The Originals", in 1962. Its mission was to support the 8th Field Hospital at Nha Trang. The detachment was authorized five HU-1A helicopters, which were replaced in March 1963 by the improved "B" version of that helicopter. Initially, two helicopters were stationed at Qui Nhon and three at Nha Trang. Later as fighting escalated, the helicopters changed locations in order to improve response time (52:71). Capt John Temperelli, Jr. was the commander of the 57th. He ran into many supply problems. The unit was not authorized a cook so a six month supply of C-rations was obtained. There was no survival equipment so the men made up kits from the local stores before leaving the U.S. The typical kit contained a machete, canned water, C-rations, lensatic compass, extra ammunition, signaling mirror, and sundry items they thought they would need in a crisis. This kit was stored in a parachute bag (22:24).

The 57th evacuated a U.S. Army Captain advisor on 12 May 1962 for their first mission. The evacuation was from Tuy Hoa, sixty five kilometers north of Nha Trang. The captain, suffering from an extremely high fever, was flown to the 8th Field Hospital (22:24).

On 8 February 1962 the U.S. Military Assistance Command, Vietnam (MACV) was established. Before MACV, the Military Assistance Advisory Group (MAAG) acted as the senior military headquarters for all military units in Vietnam. MAAG was comprised of Army, Air Force, and Navy sections which were responsible for advising their counterparts in the Vietnamese military. As the first COMUSMACV (Commander, U.S. Military Assistance Command, Vietnam), Lieutenant General Paul D. Harkins did not get rid of the MAAG but kept it for advisory and operational matters in support of MACV. MAAG also responded to the Commander-in-Chief, Pacific (CINCPAC), for the administration of the Military Assistance Program. The multiple lines of communication created some confusion within U.S. units in Vietnam. For example, since MAAG had operational control of Army aviation units, the Senior Advisor assigned to a Vietnamese Army Corps could request U.S. Army aviation support. In fact the Vietnamese Corps Commander could directly request helicopter aeromedical support. The advisor assigned to the corps would formally transmit a request to the commanding officer of a U.S. helicopter company for support.

So, a request for aeromedical evacuation consisted of a minimum of three individuals; the Vietnamese Corps Commander; the MAAG representative; and the commander of the helicopter company. Problems which could not be settled between the advisor and the helicopter commander were elevated to General Harkins. The helicopter commander had to deal with, and satisfy on a daily basis, the Vietnamese Army, MAAG, MACV, and the U.S. Army Support Group. Captain Temperelli faced a futile bureaucratic chain of command (19:57).

Captain Temperelli also ran into many transportation problems as the commander of the 57th. He attempted to relocate JP-4 storage areas to locations which would provide better refueling capability for the helicopters. Neither Nha Trang nor Qui Non had refueling capability. He also tried to get approval to replace unnecessary cockpit heaters with auxiliary fuel cells, but never received approval. There were many deficiencies and excesses identified in the lists of equipment issued to the 57th as well as other aviation units in Vietnam. The unit carried unnecessary heaters and winter clothing with them to Vietnam because they were on standard equipment lists (22:25-27).

Early in the war units sent requests for parts directly to the U.S. Army supply on Okinawa. Okinawa often returned the paperwork to them for corrections to comply with directives the unit had never even heard of. After several

months of logistical chaos the Army Support Group, Vietnam (USASGV) began to coordinate the requisitioning of parts. Also, in the first year of operations, the Army supply depots in the Pacific could only supply 75 percent of the aviation orders from Vietnam. One reason for this was the unusual role of the helicopter in Vietnam. The helicopter flew more hours and wore out quicker than the peacetime estimates had calculated. Since the 57th Medical Detachment had the only UH-1s in Vietnam at the time, it had no supply for replacement parts. It had to cannibalize parts from some helicopters to keep the others flying. For example, during a visit in by General Harkins and General Earle G. Wheeler, Army Chief of Staff, two of the 57th's helicopters were on the ramp with no rotor blades because they had no spares (22:25).

Combat units also began to demand the 57th's few remaining parts. In November 1962 the 57th received instructions to bring all of its starter generators to Saigon. This was to provide parts for a large scale combat assault in which many of the combat UH-1s had bad tail rotor gear boxes and faulty starter generators. Temperelli personally took the generators to Saigon and reported to Brigadier General Joseph W. Stillwell, commander of the Army Support Group, Vietnam, that the lack of the generators on the 57th's helicopters would leave South Vietnam without air evacuation coverage. Temperelli suggested that the 57th fly



down to support the assault. Stillwell said no and Temperelli left without the generators but with a promise that they would be returned after the assault. Only one of the generators made it back to the 57th. The unit was totally grounded from 17 November to 15 December 1962. It was incredible that the only aeromedical helicopter evacuation unit in the country was shut down for almost a month. When the one generator was returned, the one operational helicopter was shifted back and forth between Nha Trang and Qui Nhon in an attempt to provide coverage at each location (22:25-27).

Another difficult situation was in September 1962 when General Stillwell contemplated transferring the 57th from the Medical Service to the Army Transportation Corps. Temperelli accompanied by Lt Colonel Carl A. Fisher, USASGV Surgeon and commander of the 8th Field Hospital, visited General Stillwell and convinced him to maintain the current policy (22:27).

Since the 57th flew very few missions in the first year in Vietnam, many people argued there should not be dedicated helicopters for aeromedical evacuation. Some suggested removing the red crosses and assigning support tasks to the idle medical helicopters. The senior MAAG advisor in Qui Nhon tried many times to commandeer a standby evacuation helicopter. Each time he was told that he could have priority only if he were a casualty (22:26).

Early in January 1963 an ARVN (Army of the Republic of South Vietnam) assault in the Delta convinced many people the 57th should be brought closer to the fighting. Three American advisors and sixty-five ARVN soldiers were killed and the 57th Medical Detachments at Nha Trang and Qui Nhon were too far north to help evacuate the wounded. On 16 January the Support Group ordered the 57th to move to Saigon. The 57th only had one flyable aircraft but Temperelli was told new UH-1Bs would be on the way. On 30 January the 57th arrived at Tan Son Nhut Air Base in Saigon (22:25-28).

Saigon was much different for the crews and pilots than Qui Nhon and Nha Trang. They had access to a post exchange, commissary, and many more luxuries in Saigon. The local stores sold American spirits and Armed Forces radio broadcast the latest music and sporting events. There were swimming clubs, bowling clubs, golf and tennis clubs, and access to motor-boating, rowing, and water-skiing. Even so, the veterans had very little time to enjoy all the luxuries. In late February 1963 Captain Temperelli turned over the command of the unit to Major Lloyd E. Spencer and the veteran pilots rotated out of Vietnam and the replacements arrived. After his arrival, Major Spencer was called in to see General Stillwell. He was asked how he was going to cover all the requirements in the country with just five aircraft. All Spencer could say was he would do his best. General

Stillwell promised the first five new UH-1Bs in South Vietnam to the 57th. On 11 March 1963 the last of the grounded UH-1As were signed-over for return to the United States. The following day the Support Group issued the detachment five new UH-1Es that were on a ship in Saigon harbor. On 23 March 1968, the 57th was fully operational again (22:27-28).

An initial problem encountered by the 57th was that their assigned parking area at the Tan Son Nhut Airport was directly behind the Vietnamese Air Force's C-47 Dakotas. The Vietnamese pilots always parked with the tails of their aircraft towards the 57th's area. When the C-47's engines were started, they would splatter oil all over the helicopters bubbles, windows, and windshields of the helicopters. The Vietnamese pilots were asked several times to park in the other direction, but refused. Spencer's solution to the problem was effective. He explained, "When you fly a helicopter over the tail of a C-47 it really plays hell with the planes rear elevators; so the Vietnamese got the message and moved the C-47s." In April 1963 two of the 57th's helicopters went on semipermanent standby to the town of Pleiku. Most of their missions were in support of small U.S. Army Special Forces teams in the highlands. In late June 196 one of the helicopters at Pleiku was assigned to Qui Nhon to continue coverage of that sector. In I Corps Zone to the north, U.S. Marine H-34 helicopters conducted

both combat aviation support and medical evacuation. The 57th's helicopters at Pleiku and Qui Nhon provided support for II Corps Zone, and the three helicopters at Saigon covered II and IV Corps Zones. Even though all the four corps regions of South Vietnam were covered, the evacuation capability was very thinly spread (22:27-29).

Up to this time the 57th worked without a tactical call sign. They simply used "Army" and the tail number of the aircraft. If a pilot were flying a helicopter with a tail number of 62-54321, his call sign was Army 54321. They also communicated internally on any vacant frequency they could find. Major Spencer decided this system was not acceptable. He went to Saigon and visited the Navy Support Activity (NSA) which controlled all call words used in South Vietnam. He looked through the Signal Operations Instruction Book which listed all the unused call words. Many entries like "Bandit" were more suitable for assault units, but one entry, "Dust Off" seemed appropriate for the 57th's medical evacuation missions, since the countryside was dry and dusty the helicopter pickups often blew dirt, blankets, and shelter halves all over the people on the ground (22:27-28). By giving the 57th some identity, Spencer by accident had given a name to one of the most magnificent missions in the Vietnam War. Others would later give meaning to the name as the popularity of helicopter aeromedical evacuation grew. Late in the summer of 1963 the NSA decided to reassign all of the

call signs in Vietnam. Dust Off was given to another aviation unit, the 118th Airmobile Company. Despite the urging of the NSA, the 57th refused to give up the call sign and the 118th refused to use it. The resistance was successful and the call sign remained with the 57th (19:48).

Even though the 57th retained its own call sign, it still had no formal mission statement. The pilots worked on the assumption that their main purpose was to evacuate wounded and injured U.S. military and civilian personnel. It continued to provide evacuation service to the Vietnamese when resources permitted. Major Spencer, like Capt Temperelli, continued to receive pressure from ground commanders to use Dust Off aircraft for administrative purposes. With General Stillwell's support he kept the 57th focused on the medical mission. The 57th sometimes accepted healthy passengers on a space available basis with the condition the passengers might have to leave the helicopter in the middle of nowhere if the pilot received a Dust Off request while in the air. As the year went on the 57th flew more and more Dust Off missions. On 10 September 1963, the 57th evacuated 197 Vietnamese from the Delta, where the Viet Cong had destroyed three large settlements. The Dust Off helicopters made flights with Vietnamese jammed in the passenger compartments and standing on the skids (22:29-30).

In February 1964 the 57th's third group of new pilots, crews, and maintenance personnel arrived and were under the

command of Major Charles L. Kelly. On 1 March 1964 Support Group ordered the aircraft at Pleiku and Qui Nhon to move to the Delta. Two helicopters and five pilots, now called Detachment A, 57th Medical Detachment (Helicopter Ambulance), Provisional, flew to the base at Soc Trang. Major Kelly also moved with Detachment A south, since he preferred the field to ground duty. At Soc Trang the detachment lived in crude huts with sandbags and bunkers for protection while the rest of the 57th in Saigon lived in air conditioned quarters with private baths, a mess hall, and a bar in their living quarters. Despite the difference, most pilots preferred Soc Trang (22:34-35).

It was at Soc Trang that Major Kelly began the Dust Off tradition of valorous and dedicated service. With the buildup of war activity the 57th for the first time was receiving enough Dust Off requests to keep all the pilots busy. The helicopters were showing signs of age and use and General Stillwell could not find replacement helicopters for the detachment. The pilots were flying more than 100 hours each month in medical evacuations. Some pilots stopped logging their hours after 140 hours so the flight surgeon would not ground them for going over their monthly ceiling. Even so, the Dust Off mission was once again under attack. The Support Command began pressuring the 57th to put removable red crosses on their helicopters and to begin accepting general purpose missions. Kelly told his men that the 57th

must prove its worth and "by implication the value of dedicated medical helicopters- beyond any shadow of a doubt". The 57th not only flew missions in response to requests, but began to seek missions by flying on a planned circuit of 720 kilometers at night. This plan many times delivered from ten to fifteen patients each night to their medical destinations who would have otherwise waited until the next day. During March 1964 this strategy resulted in 74 hours of night flying that evacuated nearly 25 percent of that month's 450 evacuees. General Stillwell abandoned the idea of having the 57th use removable red crosses (22:34-37).

Another problem for Kelly at this time was a lack of pilots. The Surgeon General's Aviation Branch tried to have new Medical Service Corps pilots assigned to nonmedical helicopter units in Vietnam. They thought the new pilots would benefit more from the combat training than from Dust Off flying (22:34-37). In June 1964 Kelly provided his response:

As for combat experience, the pilots in this unit are getting as much or more combat-support flying experience than any unit over here. You must understand that everybody wants to get into the Aeromedical Evacuation Business. To send pilots to U.T.T. (a nonmedical unit) or anywhere else is playing right into their hands. I fully realize that I do not know much about the big program, but our job is evacuation of casualties from the battlefield. This we do day and night, without escort aircraft, and with only one ship for each mission. The other (nonmedical) units fly in groups, rarely at night, and always heavily armed (22:37).

Kelly thought his unit had a unique mission to do and the only effective training was to be found in a Dust Off helicopter (22:37). On 1 July, 1964, he was making an approach to pick up wounded from a particularly dangerous area. The enemy was waiting and opened fire. He was repeatedly told to withdraw but refused. A U.S. advisor on the ground gave him a direct order to withdraw and Kelly replied, "When I have your wounded." A few moments later Kelly died with a bullet wound through the heart. "Dust Off" became the call sign of all Army aeromedical evacuation missions in Vietnam and "when I have your wounded" became the personal saying of many of the medevac pilots who followed Kelly (51:7-8).

After Kelly's death Captain Paul Bloomquist became the commander of the 57th Medical Detachment in Saigon and Captain Patrick H. Brady went to Soc Trang to take over Detachment A. Assuming the 57th would now select its missions more carefully, the commander of the 13th Aviation Battalion in the Delta asked Captain Brady what changes would be made, now that Kelly was gone. Brady told him that the 57th would continue to fly missions exactly as Kelly had taught them, accepting any call for help (22:37-38).

In August 1964 the Surgeon General's office named five more air ambulance units for assignment to Southeast Asia. The 82d Medical Detachment (Helicopter Ambulance) at Fort Sam Houston, Texas, was given 1 October 1964 for its move.



The four other units were put on notice without firm departure dates (22:39). The 82d Medical Detachment (Helicopter Ambulance) became operational in November 1964 in IV CTZ (the Delta) (52:71). Three of the 57th pilots were transferred to the 82d and three of the 82d pilots were transferred to the 57th. This was to aid in training. Major Henry P. Capozzi was put in command of the 82d and Major Howard H. Huntsman commanded the 57th. The question of the call sign came up. The new commanders settled on the 57th's call sign and unit emblem for the 82d. They simply changed the 57th to an 82d in the emblem. Some of the former 57th pilots objected to the piracy but the policy was practical. Both units performed the same mission and the common symbols helped the ground forces recognize the ambulance helicopters (22:39).

One drastic change was the conservative styles of Capozzi and Huntsman. They counseled their pilots to accept no missions without direct communication with the ground forces requesting the mission, to fly night missions only in extreme emergencies, and to never fly into an insecure landing zone. Despite these orders the veterans instilled the old "Kelly spirit" into the new pilots. Capozzi and Huntsman did succeed in the stopping the Kelly practice of searching for patients. They said "Shopping for business is a waste of time". This was a sound decision because of the

improved communication network and the increase in the number of Dust Off units (22:39-40).

The 283d Medical Detachment (Air Ambulance) arrived in August 1965, followed by the 498th Medical Company (Air Ambulance) in September 1965. The 254th Medical Detachment (Air Ambulance) arrived in Vietnam before the end of the year but was not operational until February 1966 because a backlog at the port delayed the arrival of the unit's equipment. The four detachments were authorized six helicopters each and supported III and IV CTZ's. The 498th Medical Company was authorized 25 helicopters and supported II CTZ (52:71).

By the beginning of 1966 the Dust Off crews were very proficient. With four years of experience to learn from, the Dust Off sorties had evolved into a very specialized method of aeromedical evacuation. The crews were extremely close knit. Each member of the four man crew had very well defined responsibilities. The success of the missions depended upon everyone knowing what they were supposed to do and doing it. The typical request would come from one of several sources. If an American or Allied unit had casualties, and a strong enough radio, they would call Dust Off directly. If Dust Off could not be reached directly, the request went to the unit's headquarters and from there to Dust Off. Whichever method was used certain information had to be given. The necessary information included the exact

location of the landing zone, the number and condition of casualties, the types of wounds, radio frequency and call sign of the unit on the ground, any special needs such as whole blood, terrain feature, enemy activity in the area, and weather conditions. The first four were critical in order for the mission to be flown. Two elements in the request were open to interpretation, the condition of the wounded and the intensity of enemy fire. Often the condition of patients was exaggerated in order to get them rapid medical attention. Landing zones were often reported secure when they were not in an effort to assure a sortie. Eventually a rule of thumb gained wide acceptance. If the people on the ground could stand up to load the wounded the landing zone was defined as secure. It was crucial that radio contact was established when the helicopter approached the landing zone (19:101-102).

A Dust Off on stand-by could be in the air in less than three minutes after receiving the evacuation request. Once in the air the pilot would tune to the Dust Off frequency and receive his mission directions. While enroute the pilot would also find the ground unit's frequency and notify it they were on the way. In addition, the pilot collected vital information about the landing zone. The copilot usually flew while the pilot worked the radio. In the rear, the crew chief and medic prepared for the wounded (19:103).

In the landing zone the crew chief and medic would quickly load the wounded or supervise the loading by personnel of the ground unit. When the patients were loaded the crew chief would give the pilot the signal to take off. The medic and crew chief would then treat the patients. The medic would report the condition of each patient to the pilot who would radio this information to the nearest medical regulating officer (MRO). Based on this information the MRO would direct Dust Off to the proper medical facility (19:103-105).

In March 1966 the 44th Medical Brigade, which had been activated in January, assumed control of most Army medical units in Vietnam. During the next two years the Brigade coordinated the activities of the 68th Medical Group (III and IV Corps Zone), the 43d Group (South II Corps Zone), the 55th Group (North II Corps Zone), and the 67th Group (I Corps Zone) (22:44).

In 1965 a new form of air ambulance unit was established: - the air ambulance platoon. These units, unlike the air ambulance units of the 44th Brigade, depended upon the combat assault divisions for command and supply. The air ambulance platoon usually consisted of twelve UH-1 helicopters. After testing the new system the initial Air Ambulance Platoon was deployed to the mountainous Central Highlands of South Vietnam in August 1965 as part of the 1st Cavalry Division (Air Mobile) 15th Medical Battalion. In

addition to providing aeromedical evacuation the unit also had the equipment to rescue downed pilots of crashed aircraft. The unit consisted of a medical evacuation section with eight helicopters and a crash rescue section with four helicopters. After the platoon's arrival in Vietnam it found that maintenance problems, general aircraft shortages, and regular evacuation missions made it impossible to keep four of the aircraft available at all times for crash rescue missions. The platoon's pilots, unlike the helicopter detachments of the 44th Medical Brigade, used "Medevac" as their call sign (22:48). They were also the first unit to have warrant officers fly aeromedical evacuations in Vietnam (19:93). To protect the platoon's aeromedical evacuation helicopters they began keeping gunships on call but the platoon's medevac pilots thought traveling with the slower gunships wasted time (22:48).

In September 1965 another type of medical evacuation unit was deployed to Vietnam: - the medical company (air ambulance). These units were authorized four two-patient helicopters and a strength of 28 officers and a larger group of enlisted men. The 498th Medical Company (Air Ambulance), under the command of Lt Colonel Joseph P. Madrano, became operational in Vietnam on 20 September 1965. The company was divided with 1 1/2 platoons at Qui Nhon, 1 1/2 platoons at Pleiku, and the fourth platoon at Nha Trang. Also at Nha Trang were the company headquarters, maintenance section,

and operations section. Because of the lack of pilots many nonmedical commissioned and warrant officer pilots were sent to the unit on loan from the 1st Logistical Command. The distance of the platoons from the headquarters in Saigon caused a few problems. Each commander in II Corps thought some or all of the air ambulances belonged to them. Each of the commanders thought the authority to dispatch a flight should be his and their troop sites deserved individual Dust Off or Medevac coverage. Though the dispersion of the company provided excellent coverage for air ambulance support it created many maintenance difficulties. Maintenance had to be accomplished at three sites by the single maintenance platoon assigned to Nha Trang (22:49-52).

The next air ambulance company established in Vietnam, the 436th Medical Company (Provisional), was established from the old 57th and 82nd Detachments, along with the 254th and 283d Detachments. The 43d Medical Group took command of the provisional company. The company's mission was to supervise all aeromedical evacuation in III and IV Corps. The company operated 22 helicopters and was expected to improve the coordination of the air ambulance detachments. The improvement did not occur. Each detachment retained its own separate identity and regarded the company as just another headquarters in the chain of command. In September 1966 the Provisional Company was renamed the 436th Medical

Detachment (Company Headquarters)(Air Ambulance) and attached to the 68th Medical Group (22:49-53).

As the war went on it was apparent that rescuing people from the dense forests was a difficult mission. The Army came up with many solutions to the problem. One of the most interesting was actually tested at Fort Bragg, North Carolina. It required the ground troops to strap a large collapsible box to the upper branches of a large tree. The box was dropped to them from the evacuation helicopter. After strapping the box to the tree, the troops were to climb down and haul the injured person back up the tree to the box. They were to wait while the helicopter hovered over the box and the helicopter crew would extend a four foot ladder down to the box. The wounded would then be taken aboard. This concept was ridiculous since it was difficult to transport the wounded to the top of the tree and the box was difficult to secure (19:105).

Another idea was called the "Jungle Canopy Platform System". This required the helicopter crew to unroll two large stainless steel nets over the tops of the jungle trees. Then, if the wounded could be moved to the treetops, the helicopter would hover over the nets, and the wounded could be picked up and evacuated. This worked well for deploying healthy troops but no commander was willing to test it in combat. This idea, like the box in the tree, soon faded away (19:105-106).

The previous ideas were not accepted and instead of trying to bring the patient to the helicopter, the solution was to bring the helicopter to the patient. To do this, a hoist was introduced. Mounted inside the top of the cargo area and anchored to the floor behind the copilot's seat, the hoist was swung outside the aircraft so the cables and pulleys were clear of the skids. It was powered by an electric winch and could lift 600 pounds 200 feet. The hoist required the helicopter to hover over the wounded and lower the cable to the ground. On the lower end of the cable was a vest. The wounded man was placed in the vest and hoisted up to the waiting helicopter. The addition of the hoist added new capabilities but also increased the danger because it required the helicopter to hover, motionless, above the pick up zone while the operation took place. A helicopter in a high hover in a combat zone is very vulnerable (19:105-107).

The first actual rescue mission using a hoist was on 17 May 1966 by Captain Donald Retzlaff, 1st Platoon, 498th Medical Company, Nha Trang. The mission was flown in support of the 101st Airborne Division, 12 miles north of Song Be. The medic rode the cable down since it was the first time the hoist was used. On the ground, the medic showed the ground troops how to place the man to be rescued in the vest. The first casualty lifted was a lieutenant who had



been killed an hour before. Before that day was over, 17 wounded had been lifted by the hoist (19:108-110).

Continued use of the hoist throughout Vietnam created several improvements. A rigid lifter was added for patients who were too seriously wounded to be put in the vest.

Neither the vest nor the litter had worked very well in dense jungle areas. To solve this problem the "Jungle Penetrator" was developed (19:108-112). The penetrator was a torpedo-like 3 foot projectile attached to and lowered from the helicopter. On the ground the seats were pulled down from the bottom half of the projectile and the wounded were strapped on (34:45). The first penetrators arrived in Vietnam in June 1966 and were placed in use, after extensive training, in October (19:112).

The use of the hoist required skill and courage by the helicopter crews. The pilot usually communicated simultaneously with the ground unit and the medic and the crew chief in the rear of the helicopter. It was crucial the helicopter remain motionless while hovering 200 feet in the air. The slightest movement was amplified through the cables to the ground. Also, there was considerable anxiety waiting for the Viet Cong to fire on the helpless, hovering helicopter. Often there was darkness or strong crosswinds that made the operation even more difficult (19:113-114).

By the end of 1966, all the Dust Off and Medevac units were using hoists. As the jungle penetrator became more

popular the use of the vest was discontinued. The rigid lifter was used for patients who were unconscious or too seriously wounded for the penetrator (19:115).

In March 1967 General Westmoreland told the Commander in Chief, U.S. Army, Pacific, that his theater needed 120 air ambulances but only had 64. In April some measures were taken to correct the situation. Many helicopters and pilots were taken from nonmedical units and assigned to medical units (22:55). In addition in September 1967, the 45th Medical Company (Air Ambulance) and four other air ambulance detachments arrived in Vietnam. The units were moved around to provide the West area coverage in response to the battle situation. In 1968, four more detachments were sent to Vietnam completing the buildup of aeromedical evacuation units. By 1969 there were 116 field army helicopter ambulances in Vietnam. These were assigned to two companies and 11 separate detachments as shown in Figure 6 (52:71).

Originally there was no standard system of patient classification or categories of precedence. Then came the patient classifications of urgent - immediate attention within two hours; priority - attention within 24 hours; and routine - attention within 48 hours. Later, urgent was used to mean immediate evacuation to save life or limb, priority was used to mean 4 hours, and routine meant no expected deterioration for several hours (13:21).

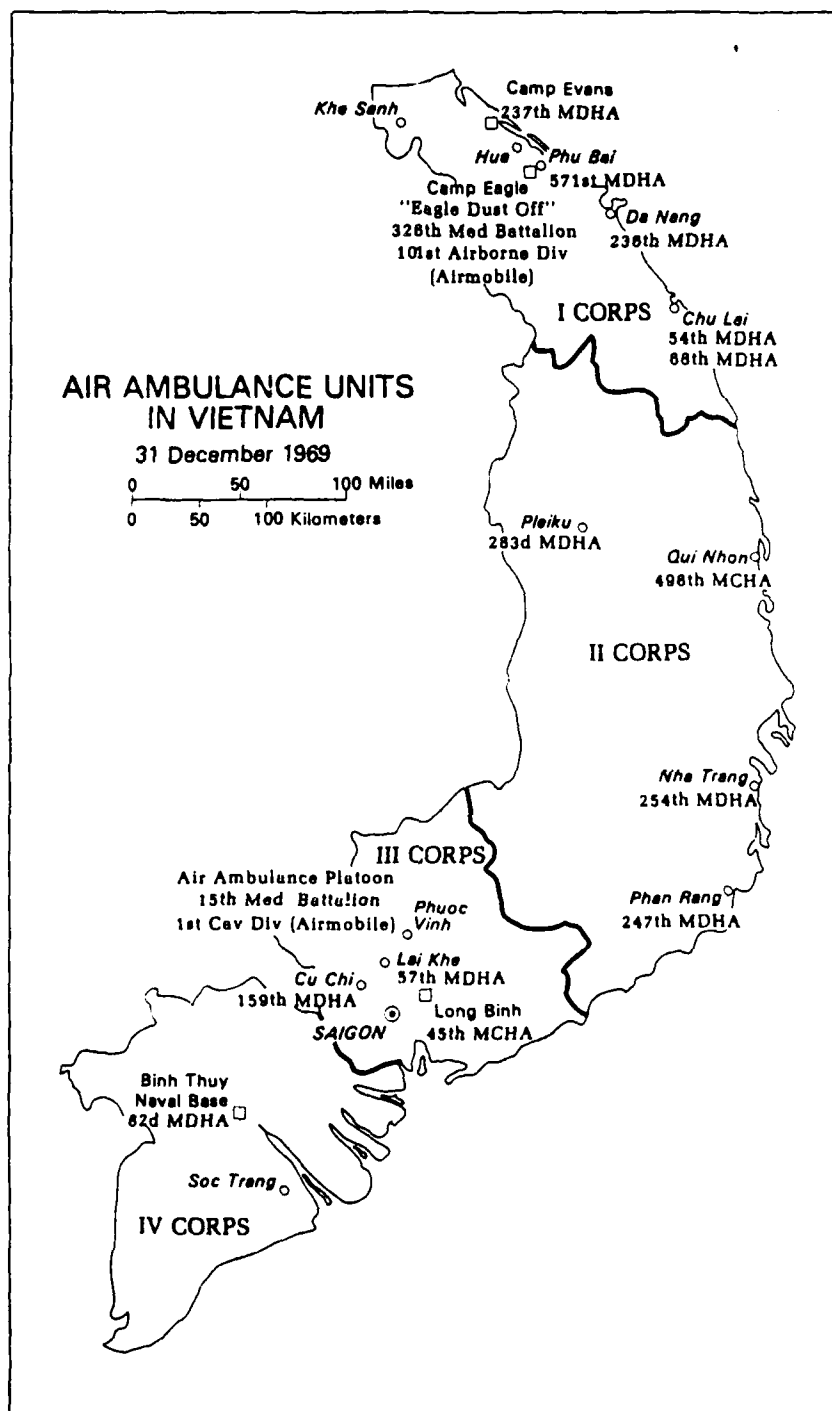


FIGURE 6. AIR AMBULANCE UNITS IN VIETNAM

One of the problems with this system, identified by Major Patrick Brady, was that the individuals who classified the patient for evacuation were usually not very well qualified to do so. An untrained person does not realize there is not necessarily a correlation between pain and the seriousness of a wound. Some soldiers would call in a wounded friend's priority as urgent so he could be evacuated immediately when the classification should have been priority or routine. Overclassification was also a problem for the Dust Off pilots since they pushed themselves into perilous situations many times for patients they thought were in the urgent classification but who were actually not (13:21).

The number of patients evacuated by Army helicopter evacuation rose from 13,004 in 1965, to 67,910 in 1966, to 85,804 in 1967, and reached a high of 106,229 in 1969. In 1969 more than 104,112 missions were completed while flying about 78,652 combat hours (51:9). Similar figures are recorded by Lieutenant General Joseph M. Heiser in Table 10. Each time a patient was moved he was counted again. Also, a significant number of the evacuees were U.S. and Vietnamese civilians.

The Dust Off crews who flew the aeromedical missions had one of the most dangerous and difficult jobs in Vietnam. Landing and evacuation under enemy fire was routine. Half the members of these crews earned Purple Hearts for wounds during their one year tour of duty (40:). Over the eleven

year period, 207 Dust Off crewmen were killed and many more wounded. There were 199 Dust Off helicopters in Vietnam (19:153-155).

Table 11 (39:214)

EVACUATIONS BY ARMY AIR AMBULANCES IN VIETNAM	
YEAR	PATIENTS
Prior to 1965	12,000
1965	11,000
1966	65,000
1967	94,000
1968	208,000
1969	241,000
1970	197,871
Total	828,871

From 1962 to 1973, a total of 496,573 missions were flown. Over 900,000 patients were evacuated to various medical facilities, almost half of those Americans. The average time lapse from wounding to hospitalization was one hour (19:153-154).

In an interview by Time magazine, U.S. Army Major Paul "Big Bear" Bloomquist was asked why he continued to stay in Vietnam. Major Bloomquist had flown 750 combat missions, been wounded 3 times, won 27 citations, and rescued more than 800 wounded soldiers at the time of the interview. He also volunteered for a second tour of duty and refused to take leave after the first 15 months he was in Vietnam. He replied;

Because, I like the excitement. And because I think that my crew and I can do this job better than anyone else. It's the job that counts above all, and it's the job that somebody has to do (31:25)

This type of dedication was found in many of the medical evacuation teams in Vietnam.

Tactical and Intratheater Evacuation. Until January 1968 intratheater medical evacuation was performed by U.S. Air Force C-130s, C-123s, and C-7s. The C-118s of the 6485th Operations Squadron, part of the 315th Air Division in Japan, with flight nurses and medical technicians from the 9th Aeromedical Evacuation Squadron, were also assigned to fly in-country evacuation missions. Committing the C-118s was one of the great improvements in medical intratheater support in Vietnam (6:281). These reciprocating engine aircraft were slower than the prop-jet C-130s and less suitable for landing at forward sites but they were permanently modified for aeromedical evacuation. The 6485th expanded from four to seven aircraft in 1966 and moved to Clark Air Base, Philippines, in early 1968. It began limited operations in January 1968 with aircraft and crews assigned three day cycles flying to fourteen Vietnamese airfields for evacuations (10:397).

9th Aeromedical Evacuation Squadron (AES) medical personnel on C-130s moved patients from Vietnam to Clark Air Base on regular flights and in May 1962 a weekly schedule was established interconnecting with the C-123s which flew

the Nha Trang-Saigon run. The C-130 aeromedical route was extended into Thailand and another aeromedical control center was established at Don Muang, in addition to the one at Tan Son Nhut Air Base. In 1963 detachments of the 9th AES were opened at Clark Air Base, Tan Son Nhut Air Base and Bangkok. Statistics compiled by the squadron in 1963 and 1964 statistics show that roughly two hundred patients were moved each month within and from Southeast Asia. Less than forty percent were battle casualties (10:396).

Patients were frequently transferred between hospitals in Vietnam. Often the transfer moved individuals to pick up points for flights back to the United States. By 1966 there were seven 400 bed field or evacuation hospitals, three 60 bed surgical hospitals, a Navy hospital in Da Nang, and a convalescent center and an Air Force hospital at Cam Rahn Bay. By 1968 the surgical hospitals were expanded to eight and evacuation hospitals to twelve. All the hospitals, except for a few near Saigon, were located by airstrips. They included Pleiku, Qui Nhon, Tuy Hoa, Nha Trang, Phu Bai, Quang Tri, and An Khe. In June 1967 the 834th Air Division transported over 7000 patients between points in Vietnam: three thousand by C-130, two thousand by C-123, and two thousand by C-7 (10:397-399).

Physicians decided priorities which determined how quickly patients should leave for destination hospitals. Like the Dust Off classifications, cases were categorized as

"urgent", "priority", and "routine". "Urgent" cases were those which had to go immediately to save a life or prevent serious medical complications. "Priority" cases were those which needed prompt medical care not available locally. These patients were to be moved within 24 hours. All other patients fell into the "routine" category and had a time limit for movement of 72 hours (2:44). All "routine" and most "priority" cases could be handled on the regularly scheduled flights. Immediate movement of the "urgent" cases required aircraft in the air be diverted, or an alert aircraft to be launched on a special mission. More than 65 percent of all the aeromedical evacuation missions within Vietnam were unscheduled. In 1966, C-130s accounted for more than 36,000 patient moves, averaging nearly 100 patients a day for that year. During the period from July 1967 to January 1968, patient movements averaged 5813 per month. From February 1968 to June 1968 the average was 9068 per month (6:281).

Scheduled intratheater flights fell into two categories. There were aeromedical evacuation flights which returned recovered patients back into Vietnam and evacuated patients outbound on a routine basis. C-118s were usually used for these flights. The other type of scheduled flight used backhaul cargo aircraft, usually the C-130. The aircraft was scheduled for a resupply mission and was reconfigured as an aeromedical evacuation flight for the return



trip. Aircraft scheduled for this type of mission sometimes originated with the medical crew on board and at other times picked up the medical crew with the patients (59:22-24).

Almost 11 times each day requirements were called in, missions were set up, medical crews were picked up, cargo offloaded, planes reconfigured, and patients evacuated (6:282). Converting the cargo or passenger aircraft consisted of removing cargo pallets or passenger seats and installing the vertical poles to support the litters. The time to do this depended on the number of seats and litters needed for a specific flight. C-141 Starlifters were reconfigured in as little as 25 minutes (59:21).

The unscheduled flights posed the most problems since they were normally diverted cargo missions reconfigured for air evacuation. The efficient use of the unscheduled missions required a lot of coordination between the aeromedical evacuation control centers (AECCs), airlift operations or airlift control centers, transport squadrons, the individual aircraft crews, and the medical facilities involved. All aircraft subject to diversion were equipped with litter brackets and other necessary equipment for transporting patients. More than 65 percent of all intratheater aeromedical evacuation missions were unscheduled (59:24-25).

On 8 July 1966 the 903d Aeromedical Evacuation Squadron was organized at Tan Soon Nhut Air Base under the 9th Aeromedical Evacuation Group. There were detachments located at

Cam Rahn Bay, Nha Trang, Qui Nhon, and Da Nang. Later, other detachments were added at Pleiku and Vuk Tau. Each detachment had two male flight nurses and up to ten aeromedical evacuation technicians. Female nurses were assigned beginning in late 1967. The detachments, besides providing medical flight crews, also operated the control elements which coordinated patient and aircraft movements with local hospitals, airlift control elements, and the AECC (10:399).

In February 1967 the 903d Medical Evacuation Flight was transferred to Phu Cat from Pope AFB and assigned to the 903d Squadron. The 903d Flight was a self contained unit of mobile teams designed to provide medical care at forward airstrips. The personnel were trained in flight and ground medical skills and had enough equipment for four 25 bed forward facilities. Teams were sent to Khe Sahn in 1967, Dong Ha in May 1967, and again to Khe Sahn in early 1968. The 903d Squadron treated and moved over 10,000 patients during the 30 day period after the Tet Offensive began in 1968 (10:399-400). C-130s operated a daily round-robin shuttle form 0700 to 1700 hours. The flight went into forward sites such as Dong Ha, Quang Tri, and Hue Phu Bai. The aircraft flew the evacuees back to Da Nang. Occasionally after the second round robin flight, patients would be flown to Qui Nhon, Phu Hiep, Nha Trang, or Cam Rahn Bay when Da Nang was full. The aircraft averaged from 125 to 158 patients a day. Another C-130 operated at night to handle

patients in the late afternoon and evening. This aircraft averaged from 40 to 60 patients per flight. During February 1968 more than 10,770 patients were evacuated on 330 flights (6:283). The unit earned the Presidential Unit Citation for this activity (10:399).

During the early part of 1968 fighting around Saigon produced many casualties which required evacuation. To accommodate this an aircraft began flying seven days a week from Tan Son Nhut to Cam Rahn Bay. Stops in between included Cu Chi, Bien Hoa, Vung Tau, and Bihn Thuy. After the 1968 surge of casualties the number of flight nurses assigned to the Far East was increased from 314 to 409. Twenty nurses were transferred from a MAC C-141 evacuation unit at McGuire AFB, New Jersey to Yokota AB, Japan. This increased the number of flight nurses there to 62. Twenty MAC nurses were also sent to Yokota for 90 days temporary duty. After that 90 days, thirty nurses were sent to replace them. Twenty of these nurses were from the 34th Aeromedical Evacuation Squadron at Kelly AFB, Texas (6:283). After 1969, the operations were reduced and the personnel were consolidated at Cam Rahn Bay in mid 1970. Two years later the squadron was phased out because its services were no longer required (10:400).

To understand the amount of work being done an example of the number of casualties evacuated from Vietnam and Thailand is found in Table 12. These are from the monthly

reports from the 9th Aeromedical Evacuation Group, part of the 315th Ai. Division. Another study of evacuations from 1965 to April 1968 shows that PACAF handled over 200,000 patient movements. This does not represent the number of patients moved, but the number of times patients were moved. Many patients may have been moved more than once in the evacuation process. The study reported that battle casualties had grown to forty percent of these evacuation moves (80:1339).

TABLE 12 (52:400)

PATIENTS EVACUATED BY PACAF AIRCRAFT			
	Month Ending 25 July 1965	Month Ending 15 June 1967	Month Ending June 1969
Intra-Vietnam	190	7023	9087
From Vietnam	607	2259	224
Intra-Thailand	11	175	176
From Thailand	41	239	9
Non-Southeast Asia	629	1703	598

By mid-1967 the number of U.S. Air Force flight nurses, medical technicians, and administrators assigned to the PACAF aeromedical evacuation system reached 300. This was a 500 percent increase in three years. This, along with the twelve-month duty cycle in Vietnam, was responsible for a continuing very low experience levels in most specialties. Less than half the nurses arriving in Vietnam had previous flight medicine training. Training was performed on the job on a one-on-one basis within the squadrons and detachments.

New individuals flew missions with experienced people until they gained the required experience and self confidence. Many medical technicians also arrived untrained. It was their responsibility to load and unload the patients as well as assist the nurses when necessary. In contrast, medical supply shortages very rarely occurred (10:399).

While patients were being airlifted the flight nurses played a very important part in their successful evacuation. Very few casualties died in the air, a tribute to the flight nurses since most of evacuation flights did not have doctors onboard. During evacuations, the flight nurses had many responsibilities often performing jobs usually left to qualified physicians. They administered blood transfusions, intravenous feedings, treated shock victims, performed emergency tracheotomies, and other emergency procedures. They not only had to deal with the wounded but with the victims of malaria, dysentery, and other diseases. The average age for these Air Force nurses was 28 years. This duty was considered the most prestigious assignment by the AF nurses and not one requested a transfer during the entire war. There were 54 PACAF flight nurses flying in the Southeast Asian area. MAC had 67 flight nurses responsible for the flights back to the United States. Both groups had difficult jobs. The PACAF nurses had to care for the recently wounded men in short often turbulent missions. The MAC

nurses dealt with supporting patients for the long flight over the Pacific Ocean (23:75-79).

The PACAF nurses work day averaged 12-14 hours with 8 hours in the air. The MAC nurses put in as many as 105 hours without relief on a roundtrip over the Pacific Ocean. Why did these nurses continue to perform such difficult missions? Senior Flight Nurse Major Jean A. Corrigan says;

The first few flights are toughies. It's scary knowing so many lives depend on just you. But somehow even our youngest nurses mature almost overnight. They seem to grow a sort of shell just thick enough to hide heartache (23:).

Senior Flight Nurse Major Lola Ball said;

If the men can make such a sacrifice and still smile, we can do our bit, too. I keep remembering a claymore casualty we flew home. He was just a kid really, and there was nothing much left of him - no arms, legs, eyes, just that big heart beating. Each time I checked to see how he was doing he whispered 'Just fine, Ma'am, thank you kindly.' Sometimes it hurt so much inside you just crawl back to your quarters and have a quiet cry (23:).

Through all this it was important for the air evacuation nurses to look attractive at all times. They knew the injured men wanted to see an ordinary American girl. The perfume atomizer was just as important an item as the medical kit (23:75-79).

Strategic and Intertheater Evacuation. The Military Airlift Command had responsibility for flights from Vietnam to the United States. Early in the war MAC aeromedical flights were used in conjunction with PACAF flights. PACAF

would fly the casualties to various hospitals in Southeast Asia and MAC would then move them to the United States (33:18). In May 1966, at the request of the USAF Surgeon General, studies were begun to examine the feasibility of starting movements from Vietnam combat zones to the United States through Japan and the Philippines. This would significantly reduce the intransit time for the patients (18:20). On 1 July 1966 the first MAC aeromedical flight transferred patients from Saigon to Travis AFB, through Yokota AB, Japan. This flight was 15 hours quicker than the old system. The elimination of aircraft transfers was also much better for the patients (33:18).

At first, the wounded were evacuated to Clark Air Base. From there they were routed to Tripler General Hospital in Hawaii, to the U.S. Army Hospital in the Ryuku Islands, or to Japan. In the summer of 1966 the equivalent of 3.5 general hospitals was established in Japan. These hospitals were for the wounded who could return to duty within 60 days (52:77).

On 28 June 1967 the first MAC aeromedical mission flew out of Da Nang for the United States. This mission flew through the Philippines, Guam, and Hawaii (18:20). By the end of 1967 scheduled flights left from Tan Son Nhut, Cam Rahn Bay, and Da Nang Air Bases in Vietnam for Yokota AB, Japan (59:18). These flights took approximately six hours. Patients assigned to the hospitals in Japan got off at

Yokota AB and other patients bound for the United States got on. Patients going to hospitals east of the Mississippi flew to Andrews AFB, Washington D.C. (18 hours via Elmendorf AFB, Alaska). Those patients going to hospitals west of the Mississippi flew to Travis AFB, California, by a direct 10 hour flight (52:77). These flights were so successful they were ultimately increased to thirteen a week (18:20).

From the experience gained from moving patients directly from Vietnam to the United States, it was learned that many of the patients could not endure the long distance. Beginning in August of 1968, the dual stage of aeromedical evacuation was initiated. Patients were transported from Vietnam to the offshore islands of Japan, Philippines, and Okinawa for more hospitalization and stabilization. When they were stabilized or ready for further movement they were flown to the United States or returned to duty. Three missions were flown daily, one each from Tan Son Nhut, Cam Rahn Bay, and Da Nang Air Bases (18:24).

Thousands of wounded were evacuated during the TET offensive in 1968. During the period of January through June, 1968, there were 55,075 patients moved out of Vietnam. The 1969 Spring Offensive also created a surge for aeromedical evacuation. MAC evacuated 7436 patients out of Vietnam during the month of March. This was the last time a large number of injured were evacuated out of Vietnam (33:19). On March 7 1969 a record high (711 patients) was



evacuated out of Vietnam by MAC. This required twelve separate missions which was also an all-time high. During the period of January-August 1969 an average of almost 11,000 casualties per month were evacuated to the United States by MAC (18:24-25).

The aircraft used by the MAC air evacuation system was mainly propeller driven at the beginning of the war but changed to an all jet system at the end. Overseas movement was by C-118s and C-135s in 1965. By the end of the war there were only two aircraft, the C-141 and C-9, accomplishing overseas movements. Both these aircraft were jet powered (33:14).

The Douglas C-118s were one of the aeromedical workhorses. The capacity was a maximum of 36 litter or 65 ambulatory patients. The flight speed was relatively slow cruising at only 307 miles per hour (33:16).

The C-141s replaced the C-135s very early in the war. The first C-141 was delivered to MAC on 23 April 1965. On November 1 the C-141 was designated the principle airlift vehicle in the Pacific. The C-141 was designed to perform aeromedical evacuations as well as to carry cargo. The capacity of the aircraft was 60 litter patients in three tiers, 100 ambulatory patients, or a combination of 27 litter and 42 ambulatory patients. To make flights better for the patients a comfort pallet augmented the standard C-141 latrine and cooking facilities. The comfort pallet was

a cubicle with two latrines, cooking facilities including two ovens, refrigeration compartments, and a coffee maker. This pallet made it possible to serve the patients hot meals during the flight (33:14-15).

An aircraft was needed specifically for medical evacuation and, after years of research and analysis, the Douglas DC-9 civil airliner was selected. The first USAF DC-9 was completed on 17 June 1968. It was the first of twelve DC-9s to be delivered. Lieutenant Colonel Mary A Tonne, Chief Flight Nurse of the 375th Aeromedical Airlift Wing, Scott AFB, Illinois gave it the nickname "Night-ingale". The interior was configured for easy conversion to accommodate a combination of litter and ambulatory patients. The normal configuration was 18 litter patients and 20 ambulatory patients (33:16-17). It was capable of carrying 40 litter patients or more than 40 ambulatory patients, or the combination of the two mentioned above along with two nurses and three aeromedical technicians (18:26). Each patient console had a nurse call system, cold air regulator, reading light, emergency oxygen mask, electrical outlet, and ash tray. The ambulatory seats were first class commercial type seats with a flexion back to allow a patient with a full leg cast to put his leg out in front of him. Wide aisles allowed patients on crutches to pass easily. Vacuum, and therapeutic oxygen, were located in the side wall

panels. Medical crew seats were located as to provide observation of all patients (33:17-18).

Other highlights of this aircraft included integral inclined ramp and stairways, isolated special care compartment, germ killing ultraviolet-filter exhaust system, and access to litters from all sides (68:102). There were three entrances to the aircraft. Two were hydraulically operated stairways. The third had an access door 6 feet 9 inches high and 11 feet 4 inches wide, with a hydraulically operated ramp, to help load and off-load stretcher patients. As the C-9 became operational the C-131 and C-118 were phased out. The last aeromedical flights for both were in 1969 (18:25).

MAC's aeromedical evacuation workload increased from 342 patient movements in January 1965 to 13, 820 in March 1969. The missions associated with those movements increased from twelve missions in January 1965 to 259 missions in March 1969 (18:25-26).

#### Specific Problems Encountered and Lessons Learned

The Vietnam War was a new experience for the American Armed Forces. This was even more true for aeromedical evacuation units and people. The experiences with aeromedical evacuation in the Korean War were only a brief introduction to the Vietnam War. Helicopter ambulances and intratheater and intertheater evacuation flights in Korea

rarely flew over enemy territory. The terrain of Korea did not have the thick jungles and forests which often obstructed aeromedical aircraft in Vietnam. Army hospitals in Korea were relatively mobile, moving with the troops, while in Vietnam almost all hospitals were in fixed locations (22:115).

Many people believe that aeromedical evacuation was the bright spot for the United States in the Vietnam War. Major General Spurgeon Neel responded, in an oral interview, when asked what the major lessons gained from the Vietnam War were, in respect to the operation of the aeromedical evacuation system;

It (medical care) is not a subsystem of logistics or a subsystem of personnel; it is a system of its own which involves hospitals and supply and maintenance and evacuation and service and management. It reaffirmed in my mind that if you had a system with helicopters, it would be a lot less expensive and a lot more efficient than a system without the helicopters..... I think that when people look back at what were the significant breakthroughs in Vietnam, they are going to talk about the vascular surgery; they are going to talk about the whole blood distribution, and all like this; but I think the one most important contribution that the Vietnam experience made to the nation is proving the feasibility of using helicopter type evacuation to provide a more efficient medical service. I think we have clearly demonstrated that, and I think that in addition to all of the good surgery that was done and all the other heroic things that were done, that is the one BIG thing that is going to profit the nation (54:32-33).

Many problems were also encountered by helicopter pilots and crews in their attempts to evacuate casualties. Initially, the poor navigation equipment and shortage of

instrument trained pilots made it difficult to navigate the mountainous terrain of Vietnam. Added to that, the weather often made it even more difficult (22:79).

One problem which continued through the war was the ground unit expectation that the air ambulances would transport the dead. Although there was nothing in the USARV regulations which authorized this, both the ARVN and American soldiers expected it. Nonmedical transport helicopters often evacuated both dead and wounded and if Dust Off helicopters had routinely refused to evacuate the dead, the combat units may have decided to rely exclusively on their non-medical transports for evacuation of both wounded and dead. Combat operations might have also suffered since the ARVN soldiers often would not advance until their dead were evacuated. So most helicopter evacuation teams evacuated the dead if it did not jeopardize the life of the wounded (22:79-81).

The language barrier was also a problem which hindered the work of the helicopter evacuation crew. Almost half of the wounded evacuated by the crews could not speak English and the crews usually could not speak enough Vietnamese, Korean, or Thai to communicate with the passengers. Even when an air ambulance unit shared a base with an ARVN unit, the language problem was serious. A former commander of the 254th Detachment recalled an experience:

The periodic attacks on the airfield were experiences to behold. Trying to get from our quarters to the

airfield was the most dangerous. The Vietnamese soldiers responsible for airfield security didn't speak English and with all the activity in the night - vehicles driving wildly about, people on the move, machine gun fire and mortar flares creating wierd lighting and shadows - the guards were confused as to who should be allowed to enter the field and who had no reason to enter. If one could get to the field before the road barriers and automatic weapons were in place all was well. Later than that, one might as well not even try to get on the field. We had several instances of the guards turning our officers back at gunpoint! We tried to get ID cards made but the Vietnamese refused to issue any cards. We sometimes felt we were in more danger trying to get to the airfield during alerts than we were picking up casualties (22:79-81).

The pilots and crews also had to deal with the always present threat of a serious accident. More pilots died from night and weather induced accidents than from enemy fire. The difficulties of flying a night mission were many. Roads and towns used as aids in navigation were not well lighted. Terrain, especially the mountains, became a great danger to pilots who lacked adequate navigation instruments. Adequate lighting at landing zones was virtually nonexistent. Many pilots refused to fly night mission while a few, like Patrick Brady, preferred them (22:81-82).

The ever-present danger of being shot was always a threat for the helicopter aeromedical evacuation crew. Comparing their loss rate with the nonmedical helicopter crews, the rate was 1.5 times as high. About forty helicopter aviators were killed by hostile fire or crashed because of hostile fire over the ten years. Another 180 were wounded or injured as a result of hostile fire. Hoist

missions were always very dangerous missions. One out of every ten hits on aeromedical evacuation helicopters occurred on hoist missions. The standard mission averaged an enemy hit every 311 trips but hoist missions averaged an enemy hit every 44 missions, approximately seven times as dangerous (22:117).

Another problem for the helicopter pilots was the resentment felt by some of the ground commanders because of their inability to control the helicopter evacuations. Even though there was usually a large rank difference between the pilot and the ground commander, there were few instances when the ground commander succeeded in getting direct support without first going through the proper request channels (22:120).

The overclassification of casualties, which was discussed earlier, was a continuing problem during the Vietnam War. This, in conjunction with the lack of proper definitions of the categories - routine, priority, and urgent - caused much controversy. Much of the controversy dealt with the classification, "priority". Most ground commanders had a difficult time saying their wounded could wait for 24 hours for medical attention, which was the time limit for priority patients. USARV headquarters changed the regulation to read, "Priority: Patients requiring prompt medical care not locally available. The precedence will be used when it is anticipated that the patient must be evac-

uated within four hours or else his condition will deteriorate to the degree that he will become an urgent case." Some people, such as Major Patrick Brady, thought there should only be two categories, urgent and nonurgent. He thought all missions should be flown as urgent, resources permitting, and the requestor should be allowed to set his own time limits on nonurgent patients (22:121).

During evacuations there were two extremes of methods used by the helicopter pilots. Some like Kelly and Brady paid little attention to the security of the landing zone, the weather, or the time of day. Others were very cautious. The USARV regulation favored the more cautious approach. There was much tension between the pilots of the two styles of evacuation. There was no attempt, and it probably would have done no good, to resolve the tension by any higher command. The regulation left the ultimate decision whether to reject or abort a mission up to the individual aircraft commander. During, Major Brady's first tour in Vietnam, he was told that if he kept taking so many risks he would either be killed or earn the Medal of Honor, which he did. Although most pilots did not perform as did Brady or Kelly, they did act bravely and honorably and earned widespread respect and gratitude from those who were in Vietnam (22:).



## V. Conclusions and Recommendations

The Vietnam War and Korean War were important parts of our country's and military history. Aeromedical evacuation played a critical role in the two wars and can be proud of its achievements. This research examined aeromedical evacuation in these two wars and the role it played. The investigative questions stated previously were answered in Chapters 3 and 4. This chapter restates those questions along with brief answers.

### Investigative Question Answers

1. What means of aeromedical evacuation were used in each war?

Both wars divided aeromedical evacuation into four basic categories; forward, intratheater, intertheater, and domestic aeromedical evacuation. Only the first three were covered in this research.

Forward aeromedical evacuation in the Korean War was initially done by Air Force helicopters and crews. Army and Marine Corps helicopters and crews eventually started aeromedical evacuation missions, also. Helicopter aeromedical evacuation was not done to the extent it was in the Vietnam War. During the Vietnam War, Army Dust Off and Medevac helicopters were the main means of forward aeromedical evacuation.

Intratheater aeromedical evacuation was accomplished by the Air Force in both wars; FEAF in the Korean War and PACAF in the Vietnam War. The aircraft used by both FEAF (C-54, C-46, C-46) and PACAF (C-118, C-130) were identified and described.

Intertheater aeromedical evacuation was also accomplished by the Air Force in both wars; MATS in the Korean War and MAC in the Vietnam War. The C-97, C-121, and C-118 used by MATS and the C-130, C-141, and C-9A used by MAC were also discussed.

2. What types of injuries were incurred in each war?

Most wounds in both wars were caused by explosive and fragmentation weapons. This category included projectile explosives, grenades, mines, and bombs. The second highest cause for injuries in both wars was small arms weapons. This included bullets from rifles, machine guns, and other guns.

3. What types of medical equipment were used in air evacuation in each war?

The medical equipment used by the various stages of aeromedical evacuation was different. The forward aeromedical evacuation medical equipment consisted of only what was absolutely necessary, since space in the helicopter was valuable. A basic first aid kit, morphine, intravenous fluids, resuscitative equipment, and scalpels and tubes for tracheotomies were about all that were usually taken.

Intratheater and intertheater aeromedical evacuation flights had more sophisticated equipment since the flights were longer and it was necessary to keep the patients in a stable condition. Most aircraft were adapted into medical facilities as best they could be. Others, such as the C-9A, were designed specifically for aeromedical evacuation with the latest medical equipment.

4. In each war, what types of medical personnel were involved in the air evacuation and what were their responsibilities?

Medical personnel played an important role in the successful aeromedical evacuation of casualties in both the Korean War and the Vietnam War. During helicopter forward evacuations, medics were responsible for loading and unloading the wounded along with the crew chief. The medics treated the patients often with help from the crew chief. He was also responsible for operating the hoist or giving directions to the crew chief, if the crew chief operated the hoist. Once the patients were loaded, the medic would provide the status of the patient to the pilot, who would pass the information over the radio.

In intratheater and intertheater aeromedical evacuations in both Korea and Vietnam, flight nurses and medical technicians were responsible for the care of patients. The flight nurses had many responsibilities since doctors were rarely on the flights. These included caring

for the patients, blood transfusions, emergency tracheotomies, treating shock victims, and responding to other emergency conditions. The medical technicians helped the flight nurses perform these tasks. On many occasions, when the load for the medical personnel was too great, the flight crew helped as much as it could.

5. What were the organizational structures of the agencies given the responsibility of aeromedical evacuation in each of the wars?

Forward aeromedical evacuation in both wars was under the control of medical personnel, although during both wars attempts were made to place helicopter aeromedical evacuation under the auspices of transportation. This enabled people with the most knowledge in medicine to make the decisions concerning who should be evacuated and where.

Intertheater and intratheater aeromedical evacuation was provided by the transportation community, but care and determining how evacuees were to be transported was managed by medical personnel. The transportation and medical people had to and did work together in both wars.

6. How was information necessary for a successful aeromedical evacuation communicated in each of the wars?

Radios were used for communicating the requirements to the helicopters in forward aeromedical evacuation in both wars. During the Korean War, communication to the helicopters was from the Corps surgeon's office, which received

the information from a MASH unit. During the Vietnam War, the unit suffering casualties contacted the helicopter directly if their radio was strong enough. If the radio was not strong enough, the information came from the requesting unit's headquarters.

The intertheater and intratheater aeromedical evacuation in both wars required a good communication system. Information concerning patient requirements was continually passed between Korea and Japan during the Korean War and Vietnam and Japan during the Vietnam War. How much personnel, equipment, and supplies to provide depended upon this information. Unscheduled flights presented the biggest problem for intratheater aeromedical evacuation in both wars. Over half of the intratheater flights in both wars were unscheduled and were very difficult to plan for.

7. What were the aeromedical evacuation lessons learned in each conflict?

Demanding situations in both Korea and Vietnam exposed areas in which many lessons were learned. The helicopter was first put to medical evacuation use on a large scale in the Korean War. The advantages of using the helicopter over ground transportation was one of the most valuable lessons learned in the Korean War and that lesson was validated and expanded in the Vietnam War. The helicopter got the injured to medical care more quickly and in a more stable environment than did ground transportation. The use of the

helicopter reduced the number of medical facilities and medical personnel required, allowing more specialized care.

Aeromedical evacuation had an extremely positive effect on those who were wounded, injured or ill in Korea and Vietnam. A feeling of safety existed because medical care would soon be received.

Confusion often existed in both wars as to responsibilities in certain areas of medical evacuation. To prevent confusion as to who is responsible for what, a thoroughly coordinated theatre plan should identify the responsibilities of each of the military services and the units within these services. The plan should be provided to all units so that the responsibilities are well known to all concerned.

The great responsibility of aeromedical evacuation units demands they should be manned and equipped as close to 100 percent of authorization as possible.

All aeromedical evacuation units with a similar purpose should be under a single command. This would prevent duplication of efforts, permit more aircraft to be available, prevent confusion and doubt about responsibilities, and allow maximum use of the small numbers of medical personnel available.

There is also the need for ground commanders to be educated so they will realize how important aeromedical evacuation is for them. Although the evacuation of

casualties is a medical problem, the ground commander is better off when the casualties have been evacuated. For aeromedical evacuation to be successful the support of the ground commanders is absolutely necessary.

8. Were the lessons learned in the Korean War applied effectively in preparing for and conducting the Vietnam War?

The use of the helicopter in the Korean War was a lesson that was very effectively applied in the Vietnam War. Although the lesson of the helicopters was applied in Vietnam, many details were overlooked. Maintenance and equipment support for aeromedical aircraft was lacking in Vietnam, just as it had been in Korea. A lack of trained medical technicians and nurses existed in Vietnam, just as in Korea. A clear definition of responsibilities, as to who could be evacuated and how, for aeromedical evacuation units existed in Korea. In Vietnam, the same was true. Lessons learned from aeromedical evacuation in the Korean War were for the most part not used as learning tools in the Vietnam War. Although aeromedical evacuation was a success in both wars, it was through the persistent work and creativity of people on the scene that the missions were accomplished.

### Conclusions

Aeromedical evacuation is a critical part of not only medical logistics but also the operational areas of war. In wars similar to the Korean and Vietnam Wars, aeromedical

evacuation is likely to be the only answer to the problems of transportation of casualties. It should not be thought a method of evacuation to be used only when other systems cannot be used. It should be developed and designed as the primary method of evacuation. In addition, the basic doctrine should be to move the patient out of the area to a medical facility as soon and quickly as possible rather than to bring the medical facility to the patient. One agency should be responsible for the entire aeromedical evacuation process within the theater. The advantages to this organization and responsibility assignment were previously discussed.

The Korean War and Vietnam War taught us much about aeromedical evacuation. In order for that learning to become lessons it must be used to prepare for the future. If we do not remember and learn from the past, both the failures and successes, we are destined for the same mistakes that they made. We can't afford to permit that to happen.



## GLOSSARY

AD	Air Division
AECC	Aeromedical Evacuation Control Center
AES	Aeromedical Evacuation Squadron
AF	Air Force
AFB	Air Force Base
ALCC	Airlift Control Center
ARVN	Army of the Republic of Vietnam
ASMRO	Armed Services Medical Regulating Office
CINCAFPAC	Commander-in-Chief Army Forces Pacific
CINCFE	Commander-in-Chief, Far East
CINCPAC	Commander-in-Chief, Pacific
COMUSMACV	Commander, United States Military Assistance Command, Vietnam
CRO	Carded for Record Only
CTZ	Corps Tactical Zone
DA	Department of the Army
EUSAK	Eighth United States Army, Korea
FEAF	Far East Air Forces
FEC	Far East Command
FEJRMO	Far East Joint Medical Regulating Office.
JLCOM	Japan Logistical Command
JOC	Joint Operations Center
KIA	Killed in Action
LZ	Landing Zone
MAAG	Military Assistance Advisory Group
MAAGV	Military Assistance Advisory Group, Vietnam.
MAC	Military Airlift Command
MACV	Military Assistance Command, Vietnam
MAES	Medical Air Evacuation Squadron
MASH	Mobile Army Surgical Hospital
MATS	Military Air Transport Service
MES	Medical Evacuation Squadron
MRO	Medical Regulating Office(r).
MSC	Medical Service Corps
NSA	Navy Support Activity
PACAF	Pacific Air Forces
PACOM	Pacific Command

ROK	Republic of Korea
RVN	Republic of Vietnam
RVNAF	Republic of Vietnam Armed Forces
SEA	Southeast Asia
SG	Surgeon General
TD	Table of Distribution
TDY	Temporary Duty
USA	United States Army
USAF	United States Air Force
USARV	United States Army, Vietnam.
USASCV	United States Army Support Command, Vietnam.
USASGV	United States Army Support Group, Vietnam.
USMACV	United States Military Assistance Command, Vietnam
VC	Viet Cong
VNAF	Vietnamese Air Force
WIA	Wounded in Action

## BIBLIOGRAPHY

1. "Aeromedical Evacuation," USAF Medical Service Digest 6: 2-7 (June 1953).
2. Allen, Ken. "The High Road to Rapid Recovery," AIRMAN, 11: 40-45 (March 1967).
3. Allgood, Robert P. "Med Evac: Vietnam Style," Marine Corps Gazette, 52: 33-36 (August 1968).
4. Armstrong, Harry G. Theater Aeromedical Evacuation System. Washington DC: Department of the Air Force, 1957.
5. Bartlow, Gene S. "The Operator-Logistician Disconnect," Airpower Journal, 2: 23-37 (Fall 1988).
6. Berger, Carl. The United States Air Force in Southeast Asia, 1961-1973. Washington DC: U.S. Government Printing Office, 1977.
7. Biderman, Albert D. March to Calumny: The Story of American POW's in the Korean War. New York: Macmillan, 1963.
8. Bohannon, Richard L. "The Most Tragic Face of War," Airman, 10: 24-28 (July 1966).
9. Borg, Walter R. and Meredith D. Gall. Educational Research: An Introduction (Second Edition). New York: David McKay Company, Inc., 1971.
10. Bowers, Ray L. Tactical Airlift: The United States Air Force in Southeast Asia. Washington DC: Office of Air Force History, USAF, 1983.
11. Bowers, Warner F. "Evacuating Wounded From Korea," Army Information Digest, 5: 47-54 (December 1950).
12. Brady, Eugene P. "The Thread of a Concept," Marine Corps Gazette, 55: 35-42 (May 1971).
13. Brady, Patrick H. "Dustoff Operations in Vietnam," Army Logistician, 5: 18-23 (July-August 1973).
14. Burton, Paul. "The Red Ball Express Sprouts Wings," United Aircraft Quarterly Bee Hive, 41: 2-7 (Spring 1966).

15. Champion, Jasper K. "Medevac: Chinook Style," U.S. Army Aviation Digest, 14: 10-13 (June 1968).
16. Childers, Jerry W. "Dustoff," U.S. Army Aviation Digest, 13: 2-3 (May 1967).
17. "Comment on FEAF Visit," USAF Medical Service Digest, 5: 30 (June 1951).
18. A Concise History of the USAF Aeromedical Evacuation System. Washington DC: Dept of the Air Force, Dept of the Surgeon General, U.S. Government Printing Office, 1976.
19. Cook, John L. Dustoff: Illustrated History of the Vietnam War. New York: Bantam Books, 1988.
20. Cowdrey, Albert E. The Medic's War. Washington DC: U.S. Government Printing Office, 1987.
21. Deare, C. L. Jr. "Airlift in Vietnam," Air Force/Space Digest, 49: 45-50 (November 1966).
22. Dorland, Peter and James Nanney. Dust Off: Army Aeromedical Evacuation in Vietnam. Washington DC: Dept of the Army, 1982.
23. Drake, Katherine. "Our Flying Nightingales in Vietnam," Reader's Digest, 91: 73-79 (December 1967).
24. Durant, Will and Ariel Durant. The Lessons of History. New York: Simon & Schuster, 1968.
25. 801st Medical Air Evacuation Squadron History Report, April 1952. Historical Office. 801st MAES, Korea, 1952.
26. Emory, William C. Business Research Methods (Third Edition). Homewood IL: Richard D. Irwin, Inc., 1985.
27. Engle, Eloise. Medic: America's Medical Soldiers, Sailors, and Airmen in Peace and War. New York: John Day, 1967.
28. Far Eastern Air Force. Far East Air Force Command Report, December 1950. Vol I, Monthly Far East Air Force Report, Tokyo Japan: HQ FEAF, 1950.
29. "Flying Ambulances for Vietnam Casualties," Air Force and Space Digest, 49: 91+ (March 1966).

30. Futrell, Robert F. The United States Air Force in Korea 1950-1953. Washington DC: Office of Air Force History, 1983.
31. "Gamest Bastards of All: The Medical Evacuation Teams," Time, 86: 25 (2 July 1965).
32. Glaser, Ronald J. 365 Days. New York: Braziller, 1971.
33. Gordon, Richard E. MAC Aeromedical Support of Southeast Asia. Unpublished article submitted for publication to the faculty. Air Command and Staff College, Air University, Maxwell AFB AL, September 1976.
34. Haldeman, Steve. "Jungle Medevac," Army Digest, 24: 44-45 (August 1969).
35. Hall, Wilford F. "Air Evacuation," Journal of the American Medical Association 147: 1026-1028 (10 November 1951).
36. Hastings, Max. The Korean War. New York: Simon and Schuster, 1987.
37. Heaton, L.D. "Medical Support in Vietnam," Army, 16: 125-128 (October 1966).
38. Heaton, Leonard D. "Medical Support of the Soldier: A Team Effort in Saving Lives," Army, 19: 85-88 (October 1969).
39. Heiser, Joseph M. Logistic Support. Washington DC: Dept. of the Army, 1974.
40. Herrera, Barbara H. Medics in Action. Mountain View CA: Pacific Press, 1968.
41. Huston, James A. The Sinews of War: Army Logistics 1775-1953. Washington DC: U.S. Government Printing Office, 1966.
42. Leedy, Paul D. Practical Research: Planning and Design (Second Edition). New York: MacMillan Publishing Company, Inc., 1980.
43. Luehrs, R. E. "Marine Medical Evacuation," Marine Corps Gazette, 53: 56-57 (May 1969).

44. Martin, M. T. "Medical Aspects of Helicopter Air Evacuation," Journal of Aviation Medicine 23: 20-23 (February 1952).
45. McClendon, F. O., Jr. "Doctors and Dentists, Nurses and Corpsmen in Vietnam," U.S. Naval Institute Proceedings, 96: 276-289 (May 1970).
46. "Medics New Strides in Vietnam," Newsweek, 66: 98+ (13 December 1965).
47. Meneces, A.N.T. "The Transport of Casualties by Air," Military Review, 31: 82-85 (August 1951).
48. "Military Medicine Sprouts Wings," Interavia 6: 34-37 (1951).
49. "Modern Evacuation of the Wounded," Journal of Aviation Medicine, 22: 440 (December 1951).
50. "Navy Air Evacuation," U.S. Navy Medical News Letter, 20: 33-39 (31 October 1952).
51. Neel, Spurgeon. "Dust Off- When I Have Your Wounded," U.S. Army Aviation Digest, 20: 6-9 (May 1974).
52. -----. Medical Support of the U.S. Army in Vietnam 1965-1970. Washington DC: Dept of the Army, 1973.
53. -----. "Medical Considerations in Helicopter Evacuation," U.S. Armed Forces Medical Journal, 5: 220-227 (February 1954).
54. -----. U.S. Air Force Oral History Interview by John W. Ballard on 3 March 1977, Brooks AFB TX.
55. "New Route Speeds Vietnam Air Evacuation," Air Force Times, 26: 7 (10 August 1966).
56. Otto, Wayne R. "Lifesaver's Unlimited," Army Digest, 21: 20-22 (September 1966).
57. Parrish, John A. 12, 20, and 5: A Doctor's Year in Vietnam. New York: E. P. Dutton, 1972.
58. Peppers, Jerome G. Jr. Military Logistics: A History of United States Military Logistics 1935-1985. Huntsville AL: Logistics Education Foundation Publishing, 1988.

59. Pletcher, Kenneth E. "Aeromedical Evacuation in Southeast Asia," Air University Review, 19: 16-29 (March-April 1968).
60. "Praise from UN," USAF Medical Service Digest, 6: 19 (July 1951).
61. Reister, Frank A. Battle Casualties and Medical Statistics. Washington DC: Dept of the Army, 1973.
62. Renshaw, Clarence. "Vietnam's Angel of Mercy," Infantry, 61: 42-44+ (November-December 1966).
63. Schoeni, A.L. "Angels on Pinwheels," Sperryscope, 12. 4-9 (1st Quarter 1953).
64. Smith, Allen D. "Air Evacuation - Medical Obligation and Military Necessity," Air University Quarterly Review 6: 98-111 (Summer 1953).
65. -----. "Medical Evacuation and It's Influence on the Future," The Military Surgeon, 110: 323-332 (May 1952).
66. Smith, Allen D. and Charles W. Peterson. Memorandum on Medical Air Evacuation in a Combat Theater. Operations Branch, Medical Services Plans Division, Office of the Surgeon General, Korea, 20 February 1952.
67. Smith, Arthur M. "Safeguarding the Hospital Ships," Proceedings: U.S. Naval Institute, 114: 57-65 (November 88).
68. Stone, Irving. "Aeromedical Airlift Joins the Jet Age," Air Force/Space Digest 51: 102-105 (March 1968).
70. "Tactical Air Rescue in Korea," Air University Quarterly Review, 6: 120-123 (Fall 1953).
71. Tarrow, Arthur B. "USAF Hospital Clark and the Vietnam Casualties," Air University Review, 18: 85-89 (November-December 1966).
72. Thompson, Annis G. The Greatest Airlift: The Story of Combat Cargo. Tokyo Japan: Dai-Nippon Printing Company, 1954.
73. 315th Air Division. History 315th Air Division (Combat Cargo) 1 Jan 51 - 30 Jun 51. Historical Office. 315th Air Division (CC) APO 959, 1951.

74. -----. History 315th Air Division (Combat Cargo) 1 Jul 51 - 31 Dec 51. Historical Office. 315th Air Division (CC) APO 959, 1952.
75. Tilford, Earl H. Search and Rescue in Southeast Asia, 1961-1975. Washington DC: Dept of the Air Force, 1980.
76. U.S. Air Force. The U.S. Air Force Medical Service and the Korean War (1950-1953). Department of the Air Force, Office of the Surgeon General, 22 August 1960.
77. -----. United States Air Force Operations in the Korean Conflict 1 November 1950 - 30 June 1952. Historical Division. Research Studies Institute (AU), Maxwell AFB AL, 1 July 1955.
78. -----. United States Air Force Operations in the Korean Conflict 1 July 1952 - 27 July 1953. Historical Division. Research Studies Institute (AU), Maxwell AFB AL, 1 July 1956.
79. White, M.S., et al. "Results of Early Aero-Medical Evacuation of Vietnam Casualties," Aerospace Medicine, 42: 780-784 (July 1971).
80. -----. "Medical Aspects of Air Evacuation of Casualties from Southeast Asia," Aerospace Medicine, 39: 1338-1341 (December 1968).
81. Williams, Fenton A. Just Before the Dawn: A Doctor's Experiences in Vietnam. New York: Exposition Press, 1971.
82. Willwerth, James K. "Nightingale," Airman, 13: 30-33 (May 1969).
83. Winchester James H. "Dust Off! Dust Off!: Lifeline Home from Vietnam," Reader's Digest, 88: 60-66 (May 1966).
84. Witze, Claude. "Flying Ambulances for Vietnam Casualties," Air Force/Space Digest, 49: 91+ (March 1966).



### Vita

Captain Fred M. Clingman was born on 2 January 1957 at Tachikawa AFB, Japan. He graduated from high school in Wheatland, California in 1975 and enlisted in the Air Force. In 1983 he received the degree of Bachelor of Professional Studies from Barry University, Miami Shores, Florida. He received his commission from Officer Training School, Lackland Air Force Base, San Antonio, Texas on 29 February 1984 and was assigned to Minot AFB, North Dakota, as a missile maintenance officer. While there, he served as the Officer in Charge of the Scheduling Control Branch, 91st Strategic Missile Wing and the Officer in Charge of the Missile Electrical Branch, 91st Organizational Missile Maintenance Organization. He earned a Master of Science in Administration from Central Michigan University in May 1987. In 1988 he was selected to attend the Air Force Institute of Technology's School of Systems and Logistics where he was enrolled in the Graduate Logistics Management Program.

Permanent Address: 5755 Oakwood Drive  
Marysville, CA 95901

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AFIT/GLM/LS/89S-9		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION School of Systems and Logistics	6b. OFFICE SYMBOL (If applicable) AFIT/LSM	7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State, and ZIP Code) Air Force Institute of Technology Wright-Patterson AFB OH 45433-6583		7b. ADDRESS (City, State, and ZIP Code)	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS	
		PROGRAM ELEMENT NO.	PROJECT NO.
		TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) ANALYSIS OF AEROMEDICAL EVACUATION IN THE KOREAN WAR AND VIETNAM WAR			
12. PERSONAL AUTHOR(S) Fred M. Clingman, M.S., Capt, USAF			
13a. TYPE OF REPORT MS Thesis	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 1989 September	15. PAGE COUNT 146
16. SUPPLEMENTARY NOTATION			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
15	05		
		Aeromedical Evacuation, Evacuation Korean War, Medical, Vietnam War, Helicopter Evacuation	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)			
<p>Thesis Advisor: Jerome G. Peppers, Jr. Professor Emeritus</p> <p>Approved for public release: IAW AFR 190-1. <i>Larry W. Emmelhainz</i> LARRY W. EMMELHAINZ, Lt Col, USAF 14 Oct 89 Director of Research and Consultation Air Force Institute of Technology (AU) Wright-Patterson AFB OH 45433-6583</p>			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL Jerome G. Peppers, Jr.		22b. TELEPHONE (Include Area Code) (513) 878-7068	22c. OFFICE SYMBOL AFIT/LS

UNCLASSIFIED

This study examined aeromedical evacuation during the Korean War and the Vietnam War. The two wars, the Korean and the Vietnam, are the most recent in our country's history, and will most likely be the type of conflict we as a nation will be committed to in the future. The purpose of this research was to identify and describe the major logistics and operational factors of aeromedical evacuation in the Korean War and the Vietnam War. The identification of successful logistic activities in aeromedical evacuation in each of these wars permits a comparison between the wars. The description and identification of factors and the comparison between the wars provides insight to problems that may be encountered in future conflicts. From the study of past experience in these two wars we can learn from the mistakes and successes and avoid the same problems in the future.

Chapter III examined aeromedical evacuation in the Korean War. This includes forward aeromedical evacuation, intratheater aeromedical evacuation and intertheater aeromedical evacuation.

Chapter IV examined aeromedical evacuation in the Vietnam War. The military services examined in this chapter are the Air Force, Army, and Navy.

Chapter V compares and contrasts methods of aeromedical evacuation used in each war. The chapter closes with conclusions based on the comparisons and provides recommendations to improve, and prepare for, aeromedical evacuation in future wars.

UNCLASSIFIED